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## APPENDIX A: SOIL AREA/VOLUME DELINEATION INFORMATION

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## Appendix A

### Soil Area/Volume Delineation Information

Remedial investigation (RI) soil results were compared to Applicable or Relevant and Appropriate Requirements (ARARs). Thirteen parameters had at least one concentration above the applicable ARAR. The locations above ARAR were then delineated. Delineation areas were determined based on “clean” samples (below ARAR) and/or existing features such as buildings. Delineation areas have a vertical zone in accordance with New Jersey Department of Environmental Protection (NJDEP) guidance. The vertical zones were divided into two intervals, surface soil up to 2 feet in depth and subsurface soil at depths of 2 feet and greater. Assignment of samples to a vertical zone is based on initial sample depth interval, which is consistent with protocol followed in the RI.

The samples in a delineation area and vertical zone were then subjected to NJDEP’s compliance averaging protocol based on the number of samples as follows:

- Areas/Zones with nine samples or less, the arithmetic mean is calculated. The arithmetic mean (average) was compared to applicable ARAR for compliance determination.
- Areas/Zones with 10 or more samples a 95% Upper Confidence level (UCL) were derived using USEPA ProUCL 5.1 software (USEPA 2015). The suggested 95% UCL value was compared to the applicable ARAR.

Non-detect (ND) values were handled as follows:

- For non-detect values, the value zero (0) was used to represent the ND values when deriving the arithmetic mean (per NJDEP guidance), and
- For ProUCL, ND values were entered at the reporting detection limit.

As directed by USEPA, soil results assorted with the Lot 68 soil mound (Soil Borings B-59 and B-60) were not considered for ARAR compliance because the mound is no longer present according to USEPA.

If the calculated UCL is greater than all values in the data set, the maximum sample value in the data set was used for evaluation per NJDEP guidance.

If the resulting compliance average value for a delineation area was below or equal to the applicable ARAR, no remedial action is warranted. If the resulting compliance average value for a delineation area was greater than the applicable ARAR, the delineation area for that parameter is considered in developing feasibility study alternatives.

Delineation area figures by vertical zone and parameter follow, as well as areas and volumes for areas exceeding ARAR compliance (Appendix 18 for soil alternatives) and areas exceeding Preliminary Remediation Goals (PRGs) for copper, naphthalene, trichloroethene, and m,p-xylenes (Appendix 19 for soil gas alternatives).

#### Reference:

United States Environmental Protection Agency (USEPA). 2015. Statistical Software ProUCL Version 5.1.00 for Environmental Applications for Data Sets with and without Nondetect Observations, EPA/600/R-07/041, <https://www.epa.gov/land-research/proucl-software>.



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## **APPENDIX A-1: SOIL DELINEATION FOR ARSENIC ARAR EXCEEDANCE**

**Figure A-1**  
**Site-Wide**  
**Soil Sampling Results**  
**Arsenic**  
**ARAR = 19 mg/kg**

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

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**Appendix A-1: Soil Delineation for Arsenic ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Arsenic	19	63/64			10.5	D
					11.7	D
					14.6	D
					11.5	D
					7.9	D
					2.1	D
					4.8	D
					8.7	D
					31.4	D
					36.5	D
					26.1	D
					23	D
					20.9	D
					21.3	UCL
	60/61/63/66		1.7	D		
			4.5	D		
			2.7	D		
			3	D		
			2.7	D		
			5.2	D		
			4.5	D		
			5.4	D		
			4.5	D		
			5.2	D		
			7.1	D		
			1.3	D		
			2.2	D		
			10.8	D		
			4.3	D		
			5.7	D		
			7.7	D		
			10.8	D		
			53	D		
			19.9	D		
			35.6	D		
			34.8	D		
			18.9	D		
			29.2	D		
			24.9	D		
			20.96	UCL		
	67				19.8	D
					2.8	D
					10.8	D
					3.2	D
					9.15	AVERAGE
	68		9.3	D		
			15.9	D		
			16.1	D		
			12.1	D		
			26	D		
			15.88	AVERAGE		

## Appendix A-1: Pro UCL Input\_Arsenic

Arsenic (Surface)	d_Arsenic (Surface)	Arsenic (Subsurface)	d_Arsenic (Subsurface)
1.7	1	10.5	1
4.5	1	11.7	1
2.7	1	14.6	1
3	1	11.5	1
2.7	1	7.9	1
5.2	1	2.1	1
4.5	1	4.8	1
5.4	1	8.7	1
4.5	1	31.4	1
5.2	1	36.5	1
7.1	1	26.1	1
1.3	1	23	1
2.2	1	20.9	1
10.8	1		
4.3	1		
5.7	1		
7.7	1		
10.8	1		
53	1		
19.9	1		
35.6	1		
34.8	1		
18.9	1		
29.2	1		
24.9	1		

## Appendix A-1: Pro UCL Output\_Arsenic

### UCL Statistics for Data Sets with Non-Detects

#### User Selected Options

Date/Time of Computation ProUCL 5.16/1/2020 8:42:22 AM  
 From File WorkSheet.xls  
 Full Precision OFF  
 Confidence Coefficient 95%  
 Number of Bootstrap Operations 2000

#### Arsenic (Surface)

<b>General Statistics</b>					
Total Number of Observations	25		Number of Distinct Observations	20	
			Number of Missing Observations	0	
Minimum	1.3		Mean	12.22	
Maximum	53		Median	5.4	
SD	13.46		Std. Error of Mean	2.692	
Coefficient of Variation	1.101		Skewness	1.678	
<b>Normal GOF Test</b>					
Shapiro Wilk Test Statistic	0.757		<b>Shapiro Wilk GOF Test</b>		
5% Shapiro Wilk Critical Value	0.918		Data Not Normal at 5% Significance Level		
Lilliefors Test Statistic	0.272		<b>Lilliefors GOF Test</b>		
5% Lilliefors Critical Value	0.173		Data Not Normal at 5% Significance Level		
<b>Data Not Normal at 5% Significance Level</b>					
<b>Assuming Normal Distribution</b>					
<b>95% Normal UCL</b>			<b>95% UCLs (Adjusted for Skewness)</b>		
95% Student's-t UCL	16.83		95% Adjusted-CLT UCL (Chen-1995)	17.62	
			95% Modified-t UCL (Johnson-1978)	16.98	
<b>Gamma GOF Test</b>					
A-D Test Statistic	1.033		<b>Anderson-Darling Gamma GOF Test</b>		
5% A-D Critical Value	0.771		Data Not Gamma Distributed at 5% Significance Level		
K-S Test Statistic	0.207		<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
5% K-S Critical Value	0.179		Data Not Gamma Distributed at 5% Significance Level		
<b>Data Not Gamma Distributed at 5% Significance Level</b>					
<b>Gamma Statistics</b>					
k hat (MLE)	1.11		k star (bias corrected MLE)	1.003	
Theta hat (MLE)	11.02		Theta star (bias corrected MLE)	12.19	
nu hat (MLE)	55.48		nu star (bias corrected)	50.16	
MLE Mean (bias corrected)	12.22		MLE Sd (bias corrected)	12.2	
			Approximate Chi Square Value (0.05)	34.89	
Adjusted Level of Significance	0.0395		Adjusted Chi Square Value	34.03	

## Appendix A-1: Pro UCL Output\_Arsenic

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	17.57	95% Adjusted Gamma UCL (use when n<50)	18.02
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### Lognormal GOF Test

Shapiro Wilk Test Statistic	0.95	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.156	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level

**Data appear Lognormal at 5% Significance Level**

### Lognormal Statistics

Minimum of Logged Data	0.262	Mean of logged Data	1.989
Maximum of Logged Data	3.97	SD of logged Data	1.025

### Assuming Lognormal Distribution

95% H-UCL	20.96	90% Chebyshev (MVUE) UCL	20.4
95% Chebyshev (MVUE) UCL	24.22	97.5% Chebyshev (MVUE) UCL	29.51
99% Chebyshev (MVUE) UCL	39.9		

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	16.65	95% Jackknife UCL	16.83
95% Standard Bootstrap UCL	16.62	95% Bootstrap-t UCL	18.9
95% Hall's Bootstrap UCL	17.75	95% Percentile Bootstrap UCL	16.66
95% BCA Bootstrap UCL	17.12		
90% Chebyshev(Mean, Sd) UCL	20.3	95% Chebyshev(Mean, Sd) UCL	23.96
97.5% Chebyshev(Mean, Sd) UCL	29.04	99% Chebyshev(Mean, Sd) UCL	39.01

### Suggested UCL to Use

95% H-UCL	20.96
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**

H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.

**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**

Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

## Appendix A-1: Pro UCL Output\_Arsenic

<b>General Statistics</b>					
Total Number of Observations	13		Number of Distinct Observations	13	
			Number of Missing Observations	0	
Minimum	2.1		Mean	16.13	
Maximum	36.5		Median	11.7	
SD	10.57		Std. Error of Mean	2.932	
Coefficient of Variation	0.655		Skewness	0.657	
<b>Normal GOF Test</b>					
Shapiro Wilk Test Statistic	0.936		<b>Shapiro Wilk GOF Test</b>		
5% Shapiro Wilk Critical Value	0.866		Data appear Normal at 5% Significance Level		
Lilliefors Test Statistic	0.201		<b>Lilliefors GOF Test</b>		
5% Lilliefors Critical Value	0.234		Data appear Normal at 5% Significance Level		
<b>Data appear Normal at 5% Significance Level</b>					
<b>Assuming Normal Distribution</b>					
<b>95% Normal UCL</b>			<b>95% UCLs (Adjusted for Skewness)</b>		
95% Student's-t UCL	21.36		95% Adjusted-CLT UCL (Chen-1995)	21.52	
			95% Modified-t UCL (Johnson-1978)	21.44	
<b>Gamma GOF Test</b>					
A-D Test Statistic	0.19		<b>Anderson-Darling Gamma GOF Test</b>		
5% A-D Critical Value	0.742		Detected data appear Gamma Distributed at 5% Significance Level		
K-S Test Statistic	0.125		<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
5% K-S Critical Value	0.239		Detected data appear Gamma Distributed at 5% Significance Level		
<b>Detected data appear Gamma Distributed at 5% Significance Level</b>					
<b>Gamma Statistics</b>					
k hat (MLE)	2.188		k star (bias corrected MLE)	1.734	
Theta hat (MLE)	7.373		Theta star (bias corrected MLE)	9.302	
nu hat (MLE)	56.88		nu star (bias corrected)	45.09	
MLE Mean (bias corrected)	16.13		MLE Sd (bias corrected)	12.25	
			Approximate Chi Square Value (0.05)	30.69	
Adjusted Level of Significance	0.0301		Adjusted Chi Square Value	29	
<b>Assuming Gamma Distribution</b>					
95% Approximate Gamma UCL (use when n>=50))	23.7		95% Adjusted Gamma UCL (use when n<50)	25.08	
<b>Lognormal GOF Test</b>					
Shapiro Wilk Test Statistic	0.947		<b>Shapiro Wilk Lognormal GOF Test</b>		
5% Shapiro Wilk Critical Value	0.866		Data appear Lognormal at 5% Significance Level		
Lilliefors Test Statistic	0.125		<b>Lilliefors Lognormal GOF Test</b>		
5% Lilliefors Critical Value	0.234		Data appear Lognormal at 5% Significance Level		
<b>Data appear Lognormal at 5% Significance Level</b>					

## Appendix A-1: Pro UCL Output\_Arsenic

### Lognormal Statistics

Minimum of Logged Data	0.742	Mean of logged Data	2.535
Maximum of Logged Data	3.597	SD of logged Data	0.8

### Assuming Lognormal Distribution

95% H-UCL	31.09	90% Chebyshev (MVUE) UCL	28.71
95% Chebyshev (MVUE) UCL	34.08	97.5% Chebyshev (MVUE) UCL	41.54
99% Chebyshev (MVUE) UCL	56.18		

### Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

### Nonparametric Distribution Free UCLs

95% CLT UCL	20.95	95% Jackknife UCL	21.36
95% Standard Bootstrap UCL	20.69	95% Bootstrap-t UCL	22.1
95% Hall's Bootstrap UCL	21.56	95% Percentile Bootstrap UCL	20.87
95% BCA Bootstrap UCL	21.71		
90% Chebyshev(Mean, Sd) UCL	24.93	95% Chebyshev(Mean, Sd) UCL	28.91
97.5% Chebyshev(Mean, Sd) UCL	34.44	99% Chebyshev(Mean, Sd) UCL	45.3

### Suggested UCL to Use

95% Student's-t UCL    21.36

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.



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## **APPENDIX A-2: SOIL DELINEATION FOR BENZENE ARAR EXCEEDANCE**

**Figure A-2**  
**Site-Wide**  
**Soil Sampling Results**  
 Benzene  
 $ARAR = 5 \text{ mg/kg}$

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken  $\geq 2'$  based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

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**Appendix A-2: Soil Delineation for Benzene ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Benzene	5	64	0.0084	D	0.0017	D
			0.0046	ND	2.6	ND
			0.17	D	0.53	D
			0.0054	ND	7.9	D
			0.0061	ND	2.11	AVERAGE
			0.0049	ND	0.55	ND
			0.00064	D	0.31	ND
			16	D	0.0033	D
			2.02	AVERAGE	68	D
					2.6	ND
					13.60	AVERAGE



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## **APPENDIX A-3: SOIL DELINEATION FOR BENZ(A)ANTHRACENE ARAR EXCEEDANCE**

**Figure A-3**  
**Site-Wide**  
**Soil Sampling Results**  
Benz(a)anthracene  
ARAR = 17 mg/kg

Riverside Industrial Park Superfund Site  
29 Riverside Avenue  
City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
1 inch = 125 feet



Project #: 0013620  
Map Created: June 2020

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**Appendix A-3: Soil Delineation for Benzo(a)anthracene ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Benzo(a)anthracene	17	63			34	D
					0.41	D
					1.7	D
					2	D
					9.53	AVERAGE



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## **APPENDIX A-4: SOIL DELINEATION FOR BENZO(A)PYRENE ARAR EXCEEDANCE**

**Figure A-4**  
**Site-Wide**  
**Soil Sampling Results**  
 Benzo(a)pyrene  
 ARAR = 2 mg/kg

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

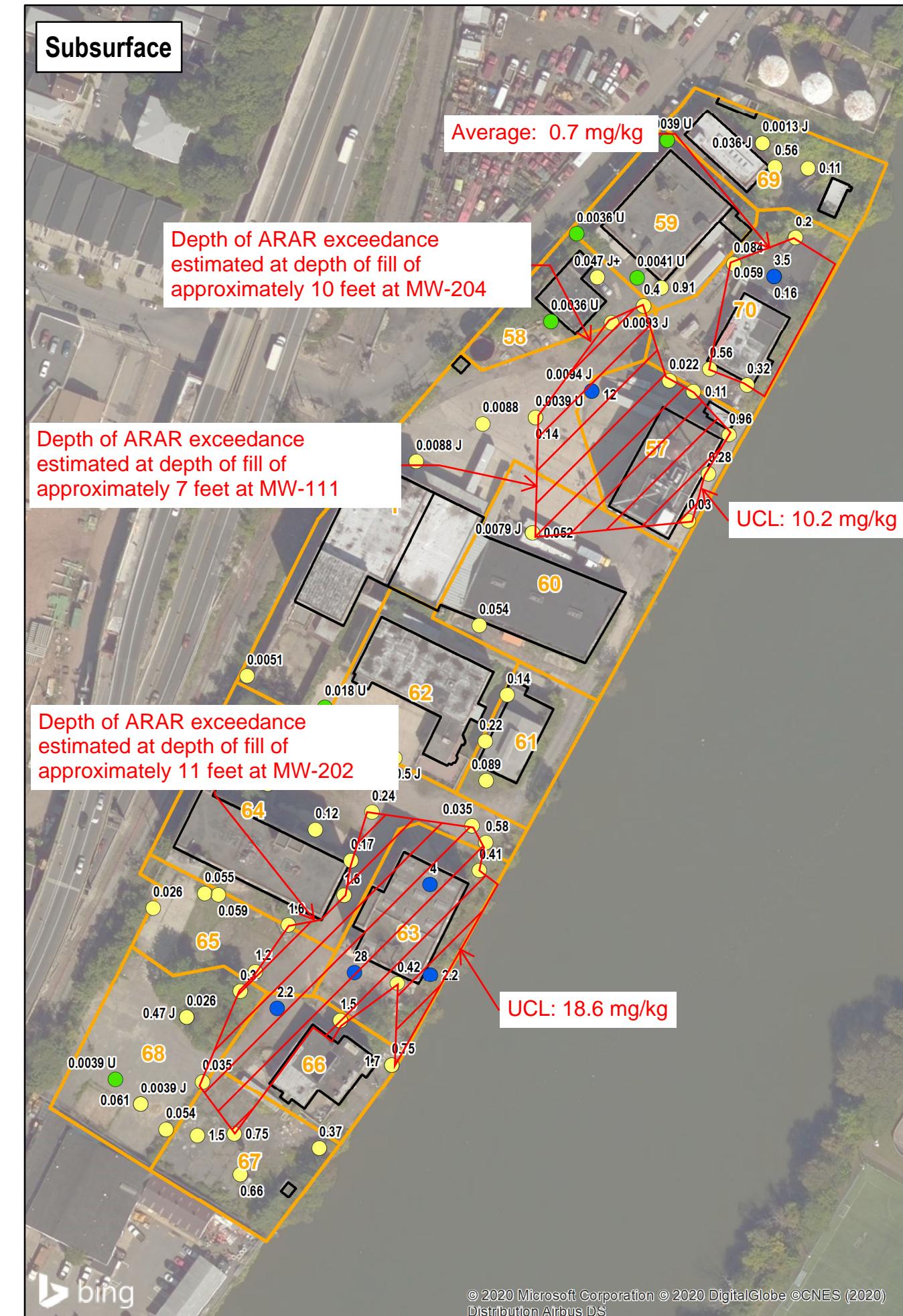
0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk.



**Appendix A-4: Soil Delineation for Benzo(a)pyrene ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Benzo(a)pyrene	2	69/70	0.57 0.725 7.3 1.1	D D D D	0.2 0.32 0.56 0.059 0.084 3.5 0.16	D D D D
					2.42	AVERAGE
		1/57/58/60/ 61/63/70	0.23	D	0.2425	D
			0.74	D	0.022	D
			0.45	D	0.11	D
			0.35	D	0.96	D
			0.32	D	0.28	D
			0.32	D	0.03	D
			0.072	D	0.052	D
			0.34	D	0.0079	D
			0.078	D	0.14	D
			0.13	D	0.0039	ND
			0.5	D	12	D
			0.027	D	0.0094	D
			0.034	D	0.0093	D
			0.21	D	10.19	UCL
			0.1295	D	0.24	D
			0.65	D	0.035	D
			0.028	D	0.58	D
			0.084	D	0.41	D
			0.43	D	0.75	D
			4.4	D	0.42	D
			2.9	D	1.5	D
			2.9	D	0.75	D
			4	D	0.035	D
			2.46	D	0.3	D
			3.8	D	1.2	D
			3.8	D	1.6	D
			3.5	D	0.17	D
			4.6	D	4	D
			2.4	D	2.2	D
			2.69	UCL	26	D
					2.2	D
					18.6	UCL
	62		2.3	D		
			4.1	D		
			0.49	D		
			0.27	D		
			1.79	Average		
	1/64		2.1	D		
			3.1	D		
			0.019	ND		
			0.51	D		
			1.4	D		
			0.82	D		
			0.092	D		
			0.53	D		
			0.347	D		
			4.3	D		
			0.88	D		
			0.89	D		
			4.2	D		
			0.0038	D		
			2.67	Average		
	64/65		0.33	D		
			5.3	D		
			0.14	D		
			1.7	D		
			0.37	D		
			2.4	D		
			6	D		
			2.32	Average		
	67		1.2	D		
			0.54	D		
			0.68	D		
			0.21	D		
			2.6	D		
			13	D		
			13	D		
			2.1	D		
			0.36			
			3.74	Average		

## Appendix A-4: Pro UCL Input\_Benzo(a)pyrene

Benzo(a)pyrene (Surface - Lots 1,57,58,60,61,63,70)	d_Benzo(a)pyrene (Surface - Lots 1,57,58,60,61,63,70)	Benzo(a)pyrene (Subsurface 1 - Lots 1,57,58,60,61,63,70)	d_Benzo(a)pyrene (Subsurface 1 - Lots 1,57,58,60,61,63,70)	Benzo(a)pyrene (Subsurface 2 - Lots 1,57,58,60,61,63,70)	d_Benzo(a)pyrene (Subsurface 2 - Lots 1,57,58,60,61,63,70)	Benzo(a)pyrene (Surface - Lots 62 and 64)	d_Benzo(a)pyrene (Surface - Lots 62 and 64)
0.23	1	0.2425	1	0.24	1	2.1	1
0.74	1	0.022	1	0.035	1	3.1	1
0.45	1	0.11	1	0.58	1	0.019	0
0.35	1	0.96	1	0.41	1	0.51	1
0.32	1	0.28	1	0.75	1	1.4	1
0.32	1	0.03	1	0.42	1	0.82	1
0.072	1	0.052	1	1.5	1	0.092	1
0.34	1	0.0079	1	0.75	1	0.53	1
0.078	1	0.14	1	0.035	1	0.347	1
0.13	1	0.0039	0	0.3	1	4.3	1
0.5	1	12	1	1.2	1	0.88	1
0.027	1	0.0094	1	1.6	1	0.89	1
0.034	1	0.0093	1	0.17	1	4.2	1
0.21	1			4	1	0.0038	1
0.1295	1			2.2	1		
0.65	1			28	1		
0.028	1			2.2	1		
0.084	1						
0.43	1						
4.4	1						
2.9	1						
2.9	1						
4	1						
2.46	1						
3.8	1						
3.8	1						
3.5	1						
4.6	1						
2.4	1						

## Appendix A-4: Pro UCL Output\_Benzo(a)Pyrene

### UCL Statistics for Data Sets with Non-Detects

#### User Selected Options

Date/Time of Computation ProUCL 5.16/1/2020 9:28:35 AM

From File WorkSheet\_b.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

#### Benzo(a)pyrene (Surface - Lots 1,57,58,60,61,63,70)

##### General Statistics

Total Number of Observations	29	Number of Distinct Observations	26
		Number of Missing Observations	0
Minimum	0.027	Mean	1.375
Maximum	4.6	Median	0.43
SD	1.622	Std. Error of Mean	0.301
Coefficient of Variation	1.179	Skewness	0.886

##### Normal GOF Test

Shapiro Wilk Test Statistic	0.758	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.308	Lilliefors GOF Test
5% Lilliefors Critical Value	0.161	Data Not Normal at 5% Significance Level
<b>Data Not Normal at 5% Significance Level</b>		

##### Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.888	95% Adjusted-CLT UCL (Chen-1995)	1.924
		95% Modified-t UCL (Johnson-1978)	1.896

##### Gamma GOF Test

A-D Test Statistic	1.186	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.8	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.172	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.171	Data Not Gamma Distributed at 5% Significance Level
<b>Data Not Gamma Distributed at 5% Significance Level</b>		

##### Gamma Statistics

k hat (MLE)	0.6	k star (bias corrected MLE)	0.561
Theta hat (MLE)	2.29	Theta star (bias corrected MLE)	2.45
nu hat (MLE)	34.83	nu star (bias corrected)	32.56
MLE Mean (bias corrected)	1.375	MLE Sd (bias corrected)	1.836
		Approximate Chi Square Value (0.05)	20.52
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	19.94

## Appendix A-4: Pro UCL Output\_Benzo(a)Pyrene

### **Assuming Gamma Distribution**

95% Approximate Gamma UCL (use when n>=50))	2.183	95% Adjusted Gamma UCL (use when n<50)	2.245
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### **Lognormal GOF Test**

Shapiro Wilk Test Statistic	0.916	<b>Shapiro Wilk Lognormal GOF Test</b>
5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.175	<b>Lilliefors Lognormal GOF Test</b>
5% Lilliefors Critical Value	0.161	Data Not Lognormal at 5% Significance Level

**Data Not Lognormal at 5% Significance Level**

### **Lognormal Statistics**

Minimum of Logged Data	-3.612	Mean of logged Data	-0.71
Maximum of Logged Data	1.526	SD of logged Data	1.664

### **Assuming Lognormal Distribution**

95% H-UCL	5.702	90% Chebyshev (MVUE) UCL	3.889
95% Chebyshev (MVUE) UCL	4.848	97.5% Chebyshev (MVUE) UCL	6.178
99% Chebyshev (MVUE) UCL	8.791		

### **Nonparametric Distribution Free UCL Statistics**

**Data do not follow a Discernible Distribution (0.05)**

### **Nonparametric Distribution Free UCLs**

95% CLT UCL	1.871	95% Jackknife UCL	1.888
95% Standard Bootstrap UCL	1.86	95% Bootstrap-t UCL	1.959
95% Hall's Bootstrap UCL	1.873	95% Percentile Bootstrap UCL	1.87
95% BCA Bootstrap UCL	1.929		
90% Chebyshev(Mean, Sd) UCL	2.279	95% Chebyshev(Mean, Sd) UCL	2.688
97.5% Chebyshev(Mean, Sd) UCL	3.256	99% Chebyshev(Mean, Sd) UCL	4.372

### **Suggested UCL to Use**

95% Chebyshev (Mean, Sd) UCL	2.688
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## **Benzo(a)pyrene (Subsurface 1 - Lots 1,57,58,60,61,63,70)**

### **General Statistics**

Total Number of Observations	13	Number of Distinct Observations	13
Number of Detects	12	Number of Non-Detects	1
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	0.0079	Minimum Non-Detect	0.0039
Maximum Detect	12	Maximum Non-Detect	0.0039
Variance Detects	11.73	Percent Non-Detects	7.692%
Mean Detects	1.155	SD Detects	3.426
Median Detects	0.081	CV Detects	2.965

## Appendix A-4: Pro UCL Output\_Benzo(a)Pyrene

Skewness Detects	3.428	Kurtosis Detects	11.81
Mean of Logged Detects	-2.407	SD of Logged Detects	2.168

### Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.379	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.439	Lilliefors GOF Test
5% Lilliefors Critical Value	0.243	Detected Data Not Normal at 5% Significance Level

**Detected Data Not Normal at 5% Significance Level**

### Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.067	KM Standard Error of Mean	0.917
KM SD	3.166	95% KM (BCA) UCL	2.907
95% KM (t) UCL	2.701	95% KM (Percentile Bootstrap) UCL	2.835
95% KM (z) UCL	2.575	95% KM Bootstrap t UCL	35.69
90% KM Chebyshev UCL	3.818	95% KM Chebyshev UCL	5.064
97.5% KM Chebyshev UCL	6.794	99% KM Chebyshev UCL	10.19

### Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.4	Anderson-Darling GOF Test
5% A-D Critical Value	0.836	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.313	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.267	Detected Data Not Gamma Distributed at 5% Significance Level

**Detected Data Not Gamma Distributed at 5% Significance Level**

### Gamma Statistics on Detected Data Only

k hat (MLE)	0.274	k star (bias corrected MLE)	0.261
Theta hat (MLE)	4.212	Theta star (bias corrected MLE)	4.422
nu hat (MLE)	6.582	nu star (bias corrected)	6.27
Mean (detects)	1.155		

### Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0079	Mean	1.067
Maximum	12	Median	0.052
SD	3.295	CV	3.088
k hat (MLE)	0.266	k star (bias corrected MLE)	0.256
Theta hat (MLE)	4.009	Theta star (bias corrected MLE)	4.168
nu hat (MLE)	6.922	nu star (bias corrected)	6.658
Adjusted Level of Significance ( $\beta$ )	0.0301		
Approximate Chi Square Value (6.66, $\alpha$ )	1.985	Adjusted Chi Square Value (6.66, $\beta$ )	1.643
95% Gamma Approximate UCL (use when n>=50)	3.58	95% Gamma Adjusted UCL (use when n<50)	4.325

### Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.067	SD (KM)	3.166
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## Appendix A-4: Pro UCL Output\_Benzo(a)Pyrene

Variance (KM)	10.02	SE of Mean (KM)	0.917
k hat (KM)	0.114	k star (KM)	0.139
nu hat (KM)	2.951	nu star (KM)	3.604
theta hat (KM)	9.397	theta star (KM)	7.696
80% gamma percentile (KM)	1.084	90% gamma percentile (KM)	3.123
95% gamma percentile (KM)	5.957	99% gamma percentile (KM)	14.32

### **Gamma Kaplan-Meier (KM) Statistics**

Approximate Chi Square Value (3.60, $\alpha$ )	0.572	Adjusted Chi Square Value (3.60, $\beta$ )	0.429
95% Gamma Approximate KM-UCL (use when n>=50)	6.724	95% Gamma Adjusted KM-UCL (use when n<50)	8.953

### **Lognormal GOF Test on Detected Observations Only**

Shapiro Wilk Test Statistic	0.919	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.243	Detected Data appear Lognormal at 5% Significance Level	

**Detected Data appear Lognormal at 5% Significance Level**

### **Lognormal ROS Statistics Using Imputed Non-Detects**

Mean in Original Scale	1.066	Mean in Log Scale	-2.81
SD in Original Scale	3.295	SD in Log Scale	2.535
95% t UCL (assumes normality of ROS data)	2.695	95% Percentile Bootstrap UCL	2.884
95% BCA Bootstrap UCL	3.915	95% Bootstrap t UCL	36.28
95% H-UCL (Log ROS)	115.4		

### **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**

KM Mean (logged)	-2.649	KM Geo Mean	0.0708
KM SD (logged)	2.163	95% Critical H Value (KM-Log)	5.164
KM Standard Error of Mean (logged)	0.627	95% H-UCL (KM -Log)	18.45
KM SD (logged)	2.163	95% Critical H Value (KM-Log)	5.164
KM Standard Error of Mean (logged)	0.627		

### **DL/2 Statistics**

DL/2 Normal	DL/2 Log-Transformed
Mean in Original Scale	1.067
SD in Original Scale	3.295
95% t UCL (Assumes normality)	2.695

**DL/2 is not a recommended method, provided for comparisons and historical reasons**

### **Nonparametric Distribution Free UCL Statistics**

**Detected Data appear Lognormal Distributed at 5% Significance Level**

### **Suggested UCL to Use**

99% KM (Chebyshev) UCL    10.19

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## Appendix A-4: Pro UCL Output\_Benzo(a)Pyrene

**Benzo(a)pyrene (Subsurface 2 - Lots 1,57,58,60,61,63,70)**

<b>General Statistics</b>					
Total Number of Observations	17		Number of Distinct Observations	14	
			Number of Missing Observations	0	
Minimum	0.035		Mean	2.611	
Maximum	28		Median	0.75	
SD	6.624		Std. Error of Mean	1.607	
Coefficient of Variation	2.537		Skewness	3.96	

### **Normal GOF Test**

Shapiro Wilk Test Statistic	0.387	<b>Shapiro Wilk GOF Test</b>
5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.407	<b>Lilliefors GOF Test</b>
5% Lilliefors Critical Value	0.207	Data Not Normal at 5% Significance Level

**Data Not Normal at 5% Significance Level**

### **Assuming Normal Distribution**

<b>95% Normal UCL</b>		<b>95% UCLs (Adjusted for Skewness)</b>	
95% Student's-t UCL	5.416	95% Adjusted-CLT UCL (Chen-1995)	6.902
		95% Modified-t UCL (Johnson-1978)	5.673

### **Gamma GOF Test**

A-D Test Statistic	1.084	<b>Anderson-Darling Gamma GOF Test</b>
5% A-D Critical Value	0.804	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.235	<b>Kolmogorov-Smirnov Gamma GOF Test</b>
5% K-S Critical Value	0.222	Data Not Gamma Distributed at 5% Significance Level

**Data Not Gamma Distributed at 5% Significance Level**

### **Gamma Statistics**

k hat (MLE)	0.474	k star (bias corrected MLE)	0.43
Theta hat (MLE)	5.504	Theta star (bias corrected MLE)	6.074
nu hat (MLE)	16.13	nu star (bias corrected)	14.62
MLE Mean (bias corrected)	2.611	MLE Sd (bias corrected)	3.983
		Approximate Chi Square Value (0.05)	6.995
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	6.449

### **Assuming Gamma Distribution**

95% Approximate Gamma UCL (use when n>=50))	5.456	95% Adjusted Gamma UCL (use when n<50)	5.918
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### **Lognormal GOF Test**

Shapiro Wilk Test Statistic	0.962	<b>Shapiro Wilk Lognormal GOF Test</b>
5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.119	<b>Lilliefors Lognormal GOF Test</b>
5% Lilliefors Critical Value	0.207	Data appear Lognormal at 5% Significance Level

**Data appear Lognormal at 5% Significance Level**

## Appendix A-4: Pro UCL Output\_Benzo(a)Pyrene

<b>Lognormal Statistics</b>			
Minimum of Logged Data	-3.352	Mean of logged Data	-0.39
Maximum of Logged Data	3.332	SD of logged Data	1.643

<b>Assuming Lognormal Distribution</b>			
95% H-UCL	12.13	90% Chebyshev (MVUE) UCL	5.374
95% Chebyshev (MVUE) UCL	6.797	97.5% Chebyshev (MVUE) UCL	8.772
99% Chebyshev (MVUE) UCL	12.65		

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

<b>Nonparametric Distribution Free UCLs</b>			
95% CLT UCL	5.254	95% Jackknife UCL	5.416
95% Standard Bootstrap UCL	5.167	95% Bootstrap-t UCL	19.72
95% Hall's Bootstrap UCL	15.84	95% Percentile Bootstrap UCL	5.654
95% BCA Bootstrap UCL	7.59		
90% Chebyshev(Mean, Sd) UCL	7.431	95% Chebyshev(Mean, Sd) UCL	9.614
97.5% Chebyshev(Mean, Sd) UCL	12.64	99% Chebyshev(Mean, Sd) UCL	18.6

### Suggested UCL to Use

99% Chebyshev (Mean, Sd) UCL    18.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## Benzo(a)pyrene (Surface - Lots 62 and 64)

<b>General Statistics</b>			
Total Number of Observations	14	Number of Distinct Observations	14
Number of Detects	13	Number of Non-Detects	1
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	0.0038	Minimum Non-Detect	0.019
Maximum Detect	4.3	Maximum Non-Detect	0.019
Variance Detects	2.229	Percent Non-Detects	7.143%
Mean Detects	1.475	SD Detects	1.493
Median Detects	0.88	CV Detects	1.012
Skewness Detects	1.114	Kurtosis Detects	-0.095
Mean of Logged Detects	-0.436	SD of Logged Detects	1.881

### Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.827	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.268	Lilliefors GOF Test
5% Lilliefors Critical Value	0.234	Detected Data Not Normal at 5% Significance Level

**Detected Data Not Normal at 5% Significance Level**

## Appendix A-4: Pro UCL Output\_Benzo(a)Pyrene

### Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.37	KM Standard Error of Mean	0.399
KM SD	1.433	95% KM (BCA) UCL	2.018
95% KM (t) UCL	2.076	95% KM (Percentile Bootstrap) UCL	2.013
95% KM (z) UCL	2.025	95% KM Bootstrap t UCL	2.312
90% KM Chebyshev UCL	2.566	95% KM Chebyshev UCL	3.107
97.5% KM Chebyshev UCL	3.859	99% KM Chebyshev UCL	5.336

### Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.291	Anderson-Darling GOF Test
5% A-D Critical Value	0.772	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.13	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.246	Detected data appear Gamma Distributed at 5% Significance Level
<b>Detected data appear Gamma Distributed at 5% Significance Level</b>		

### Gamma Statistics on Detected Data Only

k hat (MLE)	0.729	k star (bias corrected MLE)	0.612
Theta hat (MLE)	2.023	Theta star (bias corrected MLE)	2.409
nu hat (MLE)	18.96	nu star (bias corrected)	15.91
Mean (detects)	1.475		

### Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0038	Mean	1.37
Maximum	4.3	Median	0.85
SD	1.487	CV	1.085
k hat (MLE)	0.591	k star (bias corrected MLE)	0.512
Theta hat (MLE)	2.32	Theta star (bias corrected MLE)	2.678
nu hat (MLE)	16.54	nu star (bias corrected)	14.33
Adjusted Level of Significance ( $\beta$ )	0.0312		
Approximate Chi Square Value (14.33, $\alpha$ )	6.796	Adjusted Chi Square Value (14.33, $\beta$ )	6.12
95% Gamma Approximate UCL (use when n>=50)	2.889	95% Gamma Adjusted UCL (use when n<50)	3.208

### Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.37	SD (KM)	1.433
Variance (KM)	2.054	SE of Mean (KM)	0.399
k hat (KM)	0.914	k star (KM)	0.765
nu hat (KM)	25.58	nu star (KM)	21.43
theta hat (KM)	1.499	theta star (KM)	1.789
80% gamma percentile (KM)	2.244	90% gamma percentile (KM)	3.366
95% gamma percentile (KM)	4.515	99% gamma percentile (KM)	7.236

### Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (21.43, $\alpha$ )	11.91	Adjusted Chi Square Value (21.43, $\beta$ )	10.98
95% Gamma Approximate KM-UCL (use when n>=50)	2.464	95% Gamma Adjusted KM-UCL (use when n<50)	2.673

**Lognormal GOF Test on Detected Observations Only**

Shapiro Wilk Test Statistic	0.825	<b>Shapiro Wilk GOF Test</b>
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.219	<b>Lilliefors GOF Test</b>
5% Lilliefors Critical Value	0.234	Detected Data appear Lognormal at 5% Significance Level

**Detected Data appear Approximate Lognormal at 5% Significance Level****Lognormal ROS Statistics Using Imputed Non-Detects**

Mean in Original Scale	1.371	Mean in Log Scale	-0.67
SD in Original Scale	1.486	SD in Log Scale	2.008
95% t UCL (assumes normality of ROS data)	2.074	95% Percentile Bootstrap UCL	2.019
95% BCA Bootstrap UCL	2.121	95% Bootstrap t UCL	2.347
95% H-UCL (Log ROS)	52.4		

**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**

KM Mean (logged)	-0.803	KM Geo Mean	0.448
KM SD (logged)	2.187	95% Critical H Value (KM-Log)	5.054
KM Standard Error of Mean (logged)	0.608	95% H-UCL (KM -Log)	105
KM SD (logged)	2.187	95% Critical H Value (KM-Log)	5.054
KM Standard Error of Mean (logged)	0.608		

**DL/2 Statistics**

DL/2 Normal	DL/2 Log-Transformed
Mean in Original Scale	1.37
SD in Original Scale	1.487
95% t UCL (Assumes normality)	2.074

**DL/2 is not a recommended method, provided for comparisons and historical reasons****Nonparametric Distribution Free UCL Statistics****Detected Data appear Gamma Distributed at 5% Significance Level****Suggested UCL to Use**

95% KM Bootstrap t UCL	2.312	→ Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	2.673
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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.



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## **APPENDIX A-5: SOIL DELINEATION FOR BENZO(B)FLUORANTHRACENE ARAR EXCEEDANCE**

**Figure A-5**  
**Site-Wide**  
**Soil Sampling Results**  
 Benzo(b)fluoranthracene  
 ARAR = 17 mg/kg

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk.



### Appendix A-5: Soil Delineation for Benzo(b)fluoranthene ARAR Exceedance

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Benzo(b)fluoranthene	17	63			29	D
					0.58	D
					1.9	D
					2.3	D
					8.45	AVERAGE



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## **APPENDIX A-6: SOIL DELINEATION FOR DIBENZ(A,H)ANTHRACENE ARAR EXCEEDANCE**

**Figure A-6**  
**Site-Wide**  
**Soil Sampling Results**  
Dibenz(a,h)anthracene  
ARAR = 2 mg/kg

Riverside Industrial Park Superfund Site  
29 Riverside Avenue  
City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

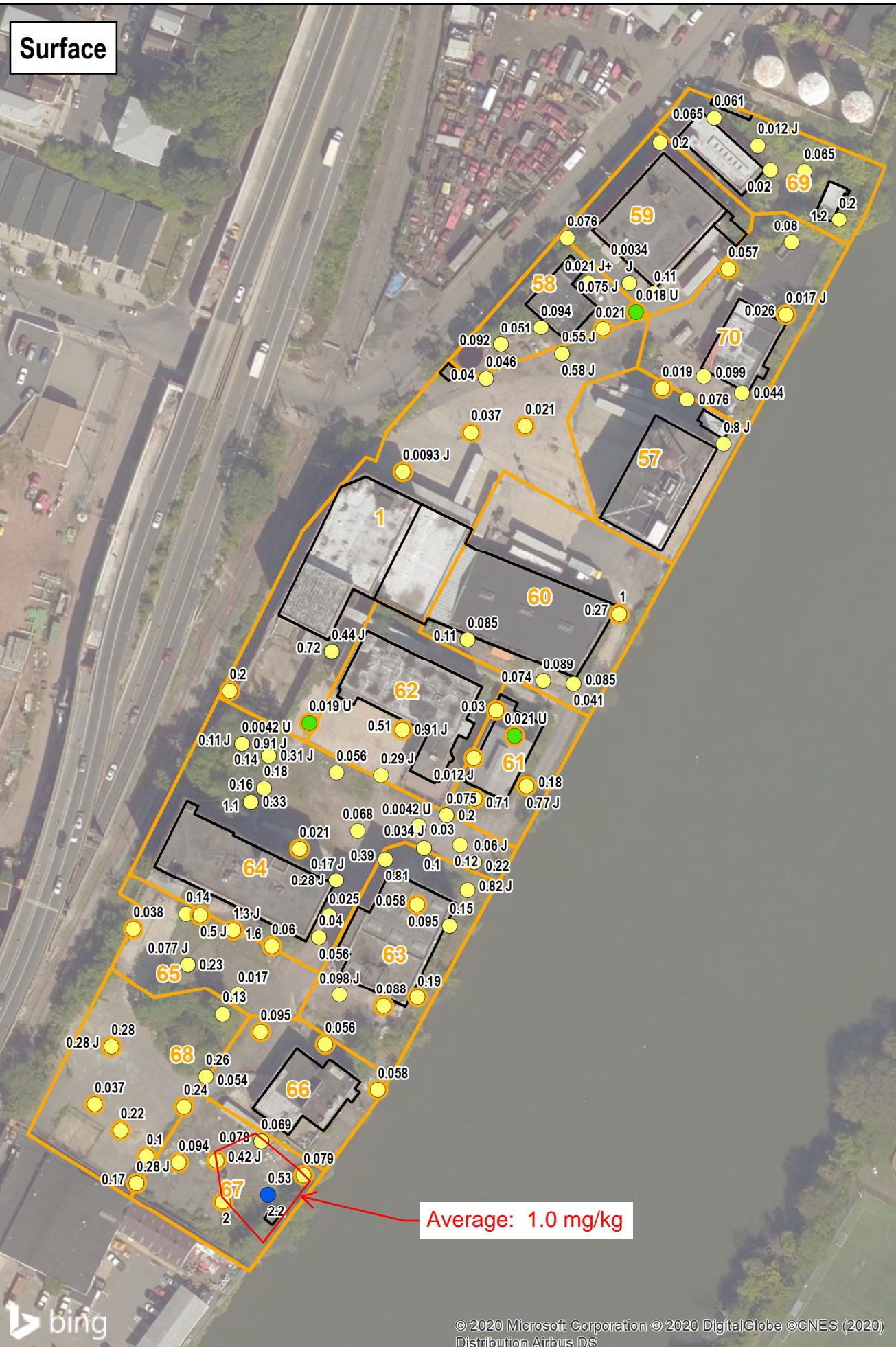
0 100 200

Feet  
1 inch = 125 feet



Project #: 0013620  
Map Created: June 2020

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**Figure A-6**  
**Site-Wide**  
**Soil Sampling Results**  
Dibenz(a,h)anthracene  
ARAR = 2 mg/kg

Riverside Industrial Park Superfund Site  
29 Riverside Avenue  
City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
1 inch = 125 feet



Project #: 0013620  
Map Created: June 2020

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk.

**Appendix A-6: Soil Delineation for Dibenz(a,h)anthracene ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Dibenz(a,h)anthracene	2	67	0.078	D		
			0.079	D		
			0.53	D		
			2	D		
			2.2	D		
			0.98	Average		
		63/64/65/66			0.3	D
					0.094	D
					0.2	D
					0.31	D
					5	D
					1.18	Average



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## **APPENDIX A-7: SOIL DELINEATION FOR LEAD ARAR EXCEEDANCE**

**Figure A-7**  
**Site-Wide**  
**Soil Sampling Results**  
**Lead**  
 $ARAR = 800 \text{ mg/kg}$

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions

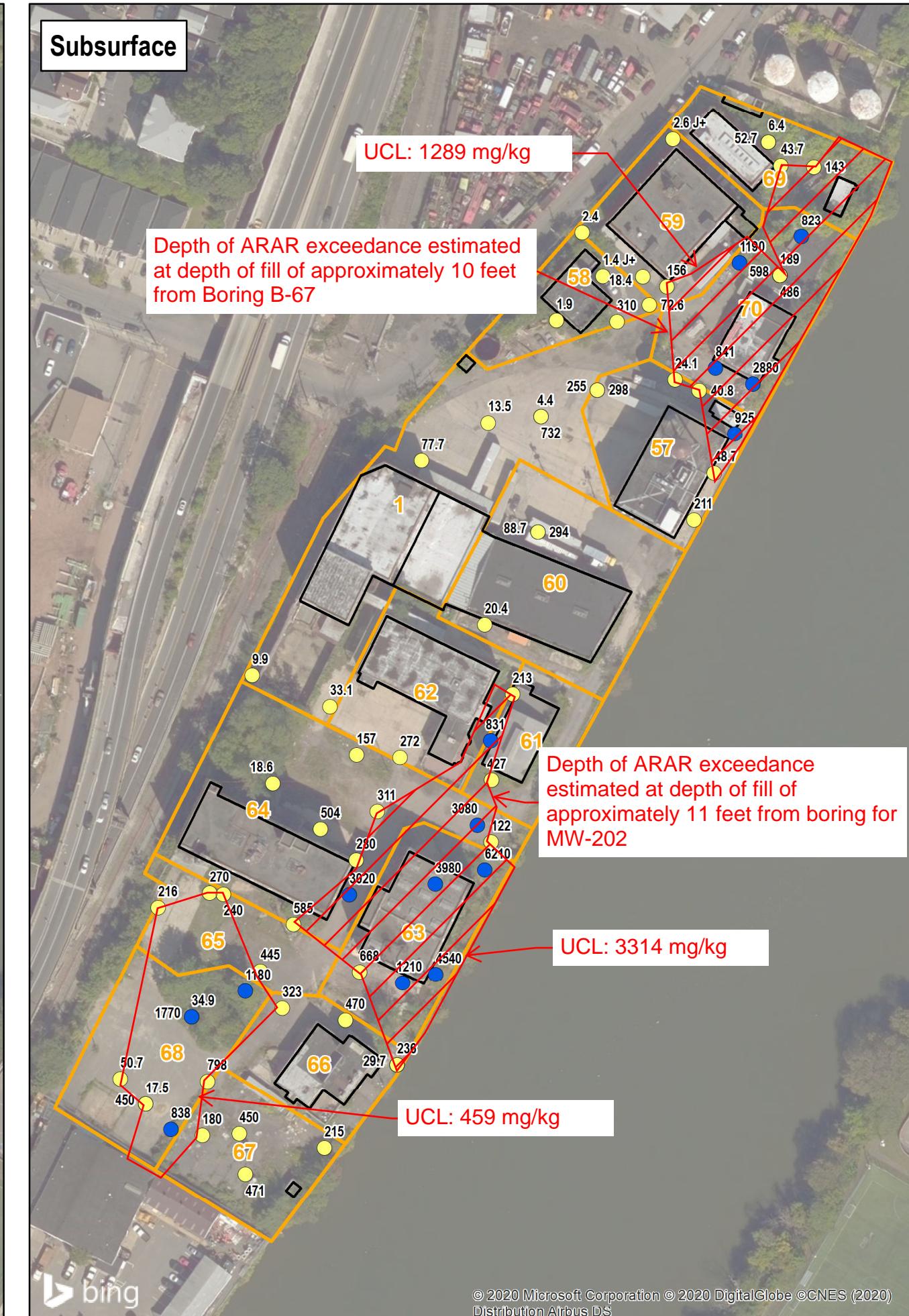
0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk.



**Appendix A-7: Soil Delineation for Lead ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Lead	800	69/70	333	D	143	D
			215	D	48.7	D
			126	D	40.8	D
			440	D	24.1	D
			48.8	D	156	D
			391	D	189	D
			622	D	486	D
			1080	D	43.7	D
			141	D	823	D
			3540	D	1190	D
					598	D
					841	D
					2880	D
					925	D
			1755	UCL	1289	UCL
	800	1,58	33.9	D		
			314	D		
			105	D		
			197	D		
			254	D		
			2000	D		
			578	D		
			1390	D		
			171	D		
			560.32	AVERAGE		
	800	1 (B-4)	650	D		
			1070	D		
			405	D		
			708.33	AVERAGE		
	800	1,64	620	D		
			405	D		
			173	D		
			92.5	D		
			439	D		
			148	D		
			71.9	D		
			794	D		
			18.1	D		
			828	D		
			441	D		
			524.9	UCL		
	800	61/63/64	421	D	213	D
			422	D	427	D
			205	D	122	D
			420	D	6210	D
			32.4	D	236	D
			97.1	D	668	D
			220	D	585	D
			168	D	280	D
			123	D	311	D
			472	D	831	D
			200	D	3080	D
			46.2	D	3980	D
			166	D	4540	D

**Appendix A-7: Soil Delineation for Lead ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Lead			153	D	1210	D
			167	D	3020	D
			210	D	3314	UCL
			218	D		
			287	D		
			683	D		
			1510	D		
			850	D		
			8690	D		
			802	D		
			3700	D		
			2370	D		
			3880	D		
			3910	D		
			851	D		
			1170	D		
			905	D		
			911	D		
			1690	D		
			1710	UCL		
Lead	800	65/67/68	314	D	270	D
			174	D	240	D
			152	D	445	D
			424	D	323	D
			159	D	798	D
			484	D	108	D
			241	D	17.5	D
			103	D	450	D
			384	D	50.7	D
			288	D	216	D
			662	D	34.9	D
			358	D	34.9	D
			295	D	838	D
			829	D	838	D
			1190	D	459.1	UCL
			400	D		
			895	D		
			299	D		
			1060	D		
			813	D		
			528	D		
			297	D		
			803	D		
			627.1	UCL		

**Appendix A-7: Pro UCL Input\_Lead**

Lead (Surface- Lots 69, 70,57)	d_Lead (Surface- Lots 69, 70,57)	Lead (Subsurface- Lots 69, 70,57)	d_Lead (Subsurface- Lots 69, 70,57)	Lead (Surface Lots 1 and 64)	d_Lead (Surface Lots 1 and 64)	Lead (Surface - Lots 61,63,64)	d_Lead (Surface - Lots 61,63,64)	Lead (Subsurface - Lots 61,63,64)	d_Lead (Subsurface - Lots 61,63,64)	Lead (Surface - Lots 65,67,68)	d_Lead (Surface - Lots 65,67,68)	Lead (Subsurface - Lots 65,67,68)	d_Lead (Subsurface - Lots 65,67,68)
333	1	143	1	620	1	421	1	213	1	314	1	270	1
215	1	48.7	1	405	1	422	1	427	1	174	1	240	1
126	1	40.8	1	173	1	205	1	122	1	152	1	445	1
440	1	24.1	1	92.5	1	420	1	6210	1	424	1	323	1
48.8	1	156	1	439	1	32.4	1	236	1	159	1	798	1
391	1	189	1	148	1	97.1	1	668	1	484	1	108	1
622	1	486	1	71.9	1	220	1	585	1	241	1	17.5	1
1080	1	43.7	1	794	1	168	1	280	1	103	1	450	1
141	1	823	1	18.1	1	123	1	311	1	384	1	50.7	1
3540	1	1190	1	828	1	472	1	831	1	288	1	216	1
		598	1	441	1	200	1	3080	1	662	1	34.9	1
		841	1			46.2	1	3980	1	358	1	838	1
		2880	1			166	1	4540	1	295	1		
		925	1			153	1	1210	1	829	1		
						167	1	3020	1	1190	1		
						210	1			400	1		
						218	1			895	1		
						287	1			299	1		
						683	1			1060	1		
						1510	1			813	1		
						850	1			528	1		
						8690	1			297	1		
						802	1			803	1		
						3700	1						
						2370	1						
						3880	1						
						3910	1						
						851	1						
						1170	1						
						905	1						
						911	1						
						1690	1						

## Appendix A-4: Pro UCL Output\_Lead

### UCL Statistics for Uncensored Full Data Sets

#### User Selected Options

Date/Time of Computation ProUCL 5.16/1/2020 9:20:09 AM

From File WorkSheet\_a.xls

Full Precision OFF

Confidence Coefficient 95%

Number of Bootstrap Operations 2000

Lead (Surface-Lots 69, 70,57)

#### General Statistics

Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	48.8	Mean	693.7
Maximum	3540	Median	362
SD	1044	Std. Error of Mean	330.2
Coefficient of Variation	1.505	Skewness	2.719

#### Normal GOF Test

Shapiro Wilk Test Statistic	0.612	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.327	Lilliefors GOF Test
5% Lilliefors Critical Value	0.262	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

#### Assuming Normal Distribution

##### 95% Normal UCL

95% Student's-t UCL 1299

##### 95% UCLs (Adjusted for Skewness)

95% Adjusted-CLT UCL (Chen-1995) 1540  
95% Modified-t UCL (Johnson-1978) 1346

#### Gamma GOF Test

A-D Test Statistic	0.482	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.206	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.275	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

#### Gamma Statistics

k hat (MLE)	0.85	k star (bias corrected MLE)	0.662
Theta hat (MLE)	815.7	Theta star (bias corrected MLE)	1048
nu hat (MLE)	17.01	nu star (bias corrected)	13.24
MLE Mean (bias corrected)	693.7	MLE Sd (bias corrected)	852.6
		Approximate Chi Square Value (0.05)	6.054
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	5.234

## Appendix A-4: Pro UCL Output\_Lead

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50) 1517      95% Adjusted Gamma UCL (use when n<50) 1755

#### Lognormal GOF Test

Shapiro Wilk Test Statistic	0.984	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.122	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level

**Data appear Lognormal at 5% Significance Level**

#### Lognormal Statistics

Minimum of Logged Data	3.888	Mean of logged Data	5.85
Maximum of Logged Data	8.172	SD of logged Data	1.202

### Assuming Lognormal Distribution

95% H-UCL 2947      90% Chebyshev (MVUE) UCL 1417  
95% Chebyshev (MVUE) UCL 1768      97.5% Chebyshev (MVUE) UCL 2255  
99% Chebyshev (MVUE) UCL 3211

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

#### Nonparametric Distribution Free UCLs

95% CLT UCL	1237	95% Jackknife UCL	1299
95% Standard Bootstrap UCL	1199	95% Bootstrap-t UCL	3049
95% Hall's Bootstrap UCL	3606	95% Percentile Bootstrap UCL	1300
95% BCA Bootstrap UCL	1620		
90% Chebyshev(Mean, Sd) UCL	1684	95% Chebyshev(Mean, Sd) UCL	2133
97.5% Chebyshev(Mean, Sd) UCL	2756	99% Chebyshev(Mean, Sd) UCL	3979

#### Suggested UCL to Use

95% Adjusted Gamma UCL 1755

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Lead (Subsurface-Lots 69, 70,57)

#### General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	24.1	Mean	599.2
Maximum	2880	Median	337.5
SD	764.9	Std. Error of Mean	204.4

## Appendix A-4: Pro UCL Output\_Lead

Coefficient of Variation      1.277      Skewness      2.241

### **Normal GOF Test**

Shapiro Wilk Test Statistic	0.735	<b>Shapiro Wilk GOF Test</b>
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.226	<b>Lilliefors GOF Test</b>
5% Lilliefors Critical Value	0.226	Data Not Normal at 5% Significance Level

**Data Not Normal at 5% Significance Level**

### **Assuming Normal Distribution**

<b>95% Normal UCL</b>	<b>95% UCLs (Adjusted for Skewness)</b>	
95% Student's-t UCL	961.2	95% Adjusted-CLT UCL (Chen-1995)    1066
		95% Modified-t UCL (Johnson-1978)    981.6

### **Gamma GOF Test**

A-D Test Statistic	0.394	<b>Anderson-Darling Gamma GOF Test</b>
5% A-D Critical Value	0.774	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.154	<b>Kolmogorov-Smirnov Gamma GOF Test</b>
5% K-S Critical Value	0.238	Detected data appear Gamma Distributed at 5% Significance Level
<b>Detected data appear Gamma Distributed at 5% Significance Level</b>		

### **Gamma Statistics**

k hat (MLE)	0.714	k star (bias corrected MLE)	0.608
Theta hat (MLE)	839.6	Theta star (bias corrected MLE)	985
nu hat (MLE)	19.98	nu star (bias corrected)	17.03
MLE Mean (bias corrected)	599.2	MLE Sd (bias corrected)	768.2
		Approximate Chi Square Value (0.05)	8.696
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	7.916

### **Assuming Gamma Distribution**

95% Approximate Gamma UCL (use when n>=50)    1174      95% Adjusted Gamma UCL (use when n<50)    1289

### **Lognormal GOF Test**

Shapiro Wilk Test Statistic	0.935	<b>Shapiro Wilk Lognormal GOF Test</b>
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.164	<b>Lilliefors Lognormal GOF Test</b>
5% Lilliefors Critical Value	0.226	Data appear Lognormal at 5% Significance Level

**Data appear Lognormal at 5% Significance Level**

### **Lognormal Statistics**

Minimum of Logged Data	3.182	Mean of logged Data	5.551
Maximum of Logged Data	7.966	SD of logged Data	1.501

### **Assuming Lognormal Distribution**

95% H-UCL	3695	90% Chebyshev (MVUE) UCL	1622
95% Chebyshev (MVUE) UCL	2045	97.5% Chebyshev (MVUE) UCL	2631
99% Chebyshev (MVUE) UCL	3784		

**Nonparametric Distribution Free UCL Statistics**  
**Data appear to follow a Discernible Distribution at 5% Significance Level**

<b>Nonparametric Distribution Free UCLs</b>			
95% CLT UCL	935.4	95% Jackknife UCL	961.2
95% Standard Bootstrap UCL	921.7	95% Bootstrap-t UCL	1213
95% Hall's Bootstrap UCL	2360	95% Percentile Bootstrap UCL	945.4
95% BCA Bootstrap UCL	1082		
90% Chebyshev(Mean, Sd) UCL	1212	95% Chebyshev(Mean, Sd) UCL	1490
97.5% Chebyshev(Mean, Sd) UCL	1876	99% Chebyshev(Mean, Sd) UCL	2633

**Suggested UCL to Use**

95% Adjusted Gamma UCL 1289

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**Lead (Surface Lots 1 and 64)**

<b>General Statistics</b>			
Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	18.1	Mean	366.4
Maximum	828	Median	405
SD	290	Std. Error of Mean	87.42
Coefficient of Variation	0.791	Skewness	0.44

**Normal GOF Test**

Shapiro Wilk Test Statistic	0.906	<b>Shapiro Wilk GOF Test</b>
5% Shapiro Wilk Critical Value	0.85	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.202	<b>Lilliefors GOF Test</b>
5% Lilliefors Critical Value	0.251	Data appear Normal at 5% Significance Level
<b>Data appear Normal at 5% Significance Level</b>		

**Assuming Normal Distribution**

95% Normal UCL	95% UCLs (Adjusted for Skewness)
95% Student's-t UCL	524.9
	95% Adjusted-CLT UCL (Chen-1995) 522.6
	95% Modified-t UCL (Johnson-1978) 526.8

**Gamma GOF Test**

A-D Test Statistic	0.337	<b>Anderson-Darling Gamma GOF Test</b>
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.207	<b>Kolmogorov-Smirnov Gamma GOF Test</b>

## Appendix A-4: Pro UCL Output\_Lead

5% K-S Critical Value 0.261      Detected data appear Gamma Distributed at 5% Significance Level

**Detected data appear Gamma Distributed at 5% Significance Level**

### **Gamma Statistics**

k hat (MLE)	1.22	k star (bias corrected MLE)	0.948
Theta hat (MLE)	300.2	Theta star (bias corrected MLE)	386.4
nu hat (MLE)	26.85	nu star (bias corrected)	20.86
MLE Mean (bias corrected)	366.4	MLE Sd (bias corrected)	376.3
		Approximate Chi Square Value (0.05)	11.49
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	10.37

### **Assuming Gamma Distribution**

95% Approximate Gamma UCL (use when n>=50) 665.3      95% Adjusted Gamma UCL (use when n<50) 737

### **Lognormal GOF Test**

Shapiro Wilk Test Statistic	0.904	<b>Shapiro Wilk Lognormal GOF Test</b>
5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.227	<b>Lilliefors Lognormal GOF Test</b>
5% Lilliefors Critical Value	0.251	Data appear Lognormal at 5% Significance Level
<b>Data appear Lognormal at 5% Significance Level</b>		

### **Lognormal Statistics**

Minimum of Logged Data	2.896	Mean of logged Data	5.441
Maximum of Logged Data	6.719	SD of logged Data	1.193

### **Assuming Lognormal Distribution**

95% H-UCL	1685	90% Chebyshev (MVUE) UCL	920.7
95% Chebyshev (MVUE) UCL	1144	97.5% Chebyshev (MVUE) UCL	1455
99% Chebyshev (MVUE) UCL	2064		

### **Nonparametric Distribution Free UCL Statistics**

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### **Nonparametric Distribution Free UCLs**

95% CLT UCL	510.2	95% Jackknife UCL	524.9
95% Standard Bootstrap UCL	503.1	95% Bootstrap-t UCL	549.9
95% Hall's Bootstrap UCL	517.7	95% Percentile Bootstrap UCL	502.6
95% BCA Bootstrap UCL	517		
90% Chebyshev(Mean, Sd) UCL	628.7	95% Chebyshev(Mean, Sd) UCL	747.5
97.5% Chebyshev(Mean, Sd) UCL	912.4	99% Chebyshev(Mean, Sd) UCL	1236

### **Suggested UCL to Use**

95% Student's-t UCL 524.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

## Appendix A-4: Pro UCL Output\_Lead

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

### **Lead (Surface - Lots 61,63,64)**

<b>General Statistics</b>					
Total Number of Observations	32	Number of Distinct Observations	32		
		Number of Missing Observations	0		
Minimum	32.4	Mean	1123		
Maximum	8690	Median	421.5		
SD	1766	Std. Error of Mean	312.2		
Coefficient of Variation	1.572	Skewness	3.005		
<b>Normal GOF Test</b>					
Shapiro Wilk Test Statistic	0.614	<b>Shapiro Wilk GOF Test</b>			
5% Shapiro Wilk Critical Value	0.93	Data Not Normal at 5% Significance Level			
Lilliefors Test Statistic	0.298	<b>Lilliefors GOF Test</b>			
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level			
<b>Data Not Normal at 5% Significance Level</b>					
<b>Assuming Normal Distribution</b>					
<b>95% Normal UCL</b>		<b>95% UCLs (Adjusted for Skewness)</b>			
95% Student's-t UCL	1653	95% Adjusted-CLT UCL (Chen-1995)	1814		
		95% Modified-t UCL (Johnson-1978)	1680		
<b>Gamma GOF Test</b>					
A-D Test Statistic	1.101	<b>Anderson-Darling Gamma GOF Test</b>			
5% A-D Critical Value	0.792	Data Not Gamma Distributed at 5% Significance Level			
K-S Test Statistic	0.157	<b>Kolmogorov-Smirnov Gamma GOF Test</b>			
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level			
<b>Detected data follow Appr. Gamma Distribution at 5% Significance Level</b>					
<b>Gamma Statistics</b>					
k hat (MLE)	0.708	k star (bias corrected MLE)	0.663		
Theta hat (MLE)	1586	Theta star (bias corrected MLE)	1695		
nu hat (MLE)	45.33	nu star (bias corrected)	42.41		
MLE Mean (bias corrected)	1123	MLE Sd (bias corrected)	1380		
		Approximate Chi Square Value (0.05)	28.48		
Adjusted Level of Significance	0.0416	Adjusted Chi Square Value	27.87		
<b>Assuming Gamma Distribution</b>					
95% Approximate Gamma UCL (use when n>=50)	1673	95% Adjusted Gamma UCL (use when n<50)	1710		
<b>Lognormal GOF Test</b>					
Shapiro Wilk Test Statistic	0.975	<b>Shapiro Wilk Lognormal GOF Test</b>			
5% Shapiro Wilk Critical Value	0.93	Data appear Lognormal at 5% Significance Level			
Lilliefors Test Statistic	0.127	<b>Lilliefors Lognormal GOF Test</b>			

## Appendix A-4: Pro UCL Output\_Lead

5% Lilliefors Critical Value 0.154 Data appear Lognormal at 5% Significance Level

**Data appear Lognormal at 5% Significance Level**

### Lognormal Statistics

Minimum of Logged Data	3.478	Mean of logged Data	6.172
Maximum of Logged Data	9.07	SD of logged Data	1.331

### Assuming Lognormal Distribution

95% H-UCL	2302	90% Chebyshev (MVUE) UCL	2072
95% Chebyshev (MVUE) UCL	2508	97.5% Chebyshev (MVUE) UCL	3115
99% Chebyshev (MVUE) UCL	4306		

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	1637	95% Jackknife UCL	1653
95% Standard Bootstrap UCL	1624	95% Bootstrap-t UCL	2082
95% Hall's Bootstrap UCL	2273	95% Percentile Bootstrap UCL	1686
95% BCA Bootstrap UCL	1825		
90% Chebyshev(Mean, Sd) UCL	2060	95% Chebyshev(Mean, Sd) UCL	2484
97.5% Chebyshev(Mean, Sd) UCL	3073	99% Chebyshev(Mean, Sd) UCL	4230

### Suggested UCL to Use

95% Adjusted Gamma UCL 1710

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## Lead (Subsurface - Lots 61,63,64)

### General Statistics

Total Number of Observations	15	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	122	Mean	1714
Maximum	6210	Median	668
SD	1945	Std. Error of Mean	502.2
Coefficient of Variation	1.135	Skewness	1.209

### Normal GOF Test

Shapiro Wilk Test Statistic 0.791 **Shapiro Wilk GOF Test**

## Appendix A-4: Pro UCL Output\_Lead

5% Shapiro Wilk Critical Value	0.881	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.275	<b>Lilliefors GOF Test</b>
5% Lilliefors Critical Value	0.22	Data Not Normal at 5% Significance Level
<b>Data Not Normal at 5% Significance Level</b>		

### Assuming Normal Distribution

95% Normal UCL	95% UCLs (Adjusted for Skewness)
95% Student's-t UCL 2599	95% Adjusted-CLT UCL (Chen-1995) 2708
	95% Modified-t UCL (Johnson-1978) 2625

### Gamma GOF Test

A-D Test Statistic	0.682	<b>Anderson-Darling Gamma GOF Test</b>
5% A-D Critical Value	0.77	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.184	<b>Kolmogorov-Smirnov Gamma GOF Test</b>
5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level
<b>Detected data appear Gamma Distributed at 5% Significance Level</b>		

### Gamma Statistics

k hat (MLE)	0.845	k star (bias corrected MLE)	0.721
Theta hat (MLE)	2027	Theta star (bias corrected MLE)	2378
nu hat (MLE)	25.36	nu star (bias corrected)	21.63
MLE Mean (bias corrected)	1714	MLE Sd (bias corrected)	2019
		Approximate Chi Square Value (0.05)	12.06
Adjusted Level of Significance	0.0324	Adjusted Chi Square Value	11.19

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	3074	95% Adjusted Gamma UCL (use when n<50)	3314
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### Lognormal GOF Test

Shapiro Wilk Test Statistic	0.931	<b>Shapiro Wilk Lognormal GOF Test</b>
5% Shapiro Wilk Critical Value	0.881	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.172	<b>Lilliefors Lognormal GOF Test</b>
5% Lilliefors Critical Value	0.22	Data appear Lognormal at 5% Significance Level
<b>Data appear Lognormal at 5% Significance Level</b>		

### Lognormal Statistics

Minimum of Logged Data	4.804	Mean of logged Data	6.75
Maximum of Logged Data	8.734	SD of logged Data	1.275

### Assuming Lognormal Distribution

95% H-UCL	5748	90% Chebyshev (MVUE) UCL	3726
95% Chebyshev (MVUE) UCL	4614	97.5% Chebyshev (MVUE) UCL	5847
99% Chebyshev (MVUE) UCL	8267		

### Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

## Appendix A-4: Pro UCL Output\_Lead

### **Nonparametric Distribution Free UCLs**

95% CLT UCL	2540	95% Jackknife UCL	2599
95% Standard Bootstrap UCL	2499	95% Bootstrap-t UCL	2901
95% Hall's Bootstrap UCL	2583	95% Percentile Bootstrap UCL	2539
95% BCA Bootstrap UCL	2704		
90% Chebyshev(Mean, Sd) UCL	3221	95% Chebyshev(Mean, Sd) UCL	3903
97.5% Chebyshev(Mean, Sd) UCL	4850	99% Chebyshev(Mean, Sd) UCL	6711

### **Suggested UCL to Use**

95% Adjusted Gamma UCL 3314

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

### **Lead (Surface - Lots 65,67,68)**

#### **General Statistics**

Total Number of Observations	23	Number of Distinct Observations	23
		Number of Missing Observations	0
Minimum	103	Mean	484.9
Maximum	1190	Median	384
SD	308	Std. Error of Mean	64.22
Coefficient of Variation	0.635	Skewness	0.879

#### **Normal GOF Test**

Shapiro Wilk Test Statistic	0.899	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.914	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.187	Lilliefors GOF Test
5% Lilliefors Critical Value	0.18	Data Not Normal at 5% Significance Level

#### **Data Not Normal at 5% Significance Level**

#### **Assuming Normal Distribution**

<b>95% Normal UCL</b>		<b>95% UCLs (Adjusted for Skewness)</b>	
95% Student's-t UCL	595.1	95% Adjusted-CLT UCL (Chen-1995)	603.1
		95% Modified-t UCL (Johnson-1978)	597.1

#### **Gamma GOF Test**

A-D Test Statistic	0.381	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.124	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.183	Detected data appear Gamma Distributed at 5% Significance Level

#### **Detected data appear Gamma Distributed at 5% Significance Level**

#### **Gamma Statistics**

## Appendix A-4: Pro UCL Output\_Lead

k hat (MLE)	2.659	k star (bias corrected MLE)	2.342
Theta hat (MLE)	182.3	Theta star (bias corrected MLE)	207.1
nu hat (MLE)	122.3	nu star (bias corrected)	107.7
MLE Mean (bias corrected)	484.9	MLE Sd (bias corrected)	316.9
		Approximate Chi Square Value (0.05)	84.76
Adjusted Level of Significance	0.0389	Adjusted Chi Square Value	83.28

### **Assuming Gamma Distribution**

95% Approximate Gamma UCL (use when n>=50) 616.2      95% Adjusted Gamma UCL (use when n<50) 627.1

### **Lognormal GOF Test**

Shapiro Wilk Test Statistic	0.969	<b>Shapiro Wilk Lognormal GOF Test</b>
5% Shapiro Wilk Critical Value	0.914	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.116	<b>Lilliefors Lognormal GOF Test</b>
5% Lilliefors Critical Value	0.18	Data appear Lognormal at 5% Significance Level

**Data appear Lognormal at 5% Significance Level**

### **Lognormal Statistics**

Minimum of Logged Data	4.635	Mean of logged Data	5.984
Maximum of Logged Data	7.082	SD of logged Data	0.664

### **Assuming Lognormal Distribution**

95% H-UCL	669.2	90% Chebyshev (MVUE) UCL	706.2
95% Chebyshev (MVUE) UCL	804.4	97.5% Chebyshev (MVUE) UCL	940.7
99% Chebyshev (MVUE) UCL	1208		

### **Nonparametric Distribution Free UCL Statistics**

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### **Nonparametric Distribution Free UCLs**

95% CLT UCL	590.5	95% Jackknife UCL	595.1
95% Standard Bootstrap UCL	587.3	95% Bootstrap-t UCL	616.8
95% Hall's Bootstrap UCL	599.3	95% Percentile Bootstrap UCL	591.2
95% BCA Bootstrap UCL	601.3		
90% Chebyshev(Mean, Sd) UCL	677.5	95% Chebyshev(Mean, Sd) UCL	764.8
97.5% Chebyshev(Mean, Sd) UCL	885.9	99% Chebyshev(Mean, Sd) UCL	1124

### **Suggested UCL to Use**

95% Adjusted Gamma UCL 627.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

## Appendix A-4: Pro UCL Output\_Lead

<b>General Statistics</b>					
Total Number of Observations	12		Number of Distinct Observations	12	
			Number of Missing Observations	0	
Minimum	17.5		Mean	315.9	
Maximum	838		Median	255	
SD	276.2		Std. Error of Mean	79.73	
Coefficient of Variation	0.874		Skewness	0.937	
<b>Normal GOF Test</b>					
Shapiro Wilk Test Statistic	0.883		<b>Shapiro Wilk GOF Test</b>		
5% Shapiro Wilk Critical Value	0.859		Data appear Normal at 5% Significance Level		
Lilliefors Test Statistic	0.156		<b>Lilliefors GOF Test</b>		
5% Lilliefors Critical Value	0.243		Data appear Normal at 5% Significance Level		
<b>Data appear Normal at 5% Significance Level</b>					
<b>Assuming Normal Distribution</b>					
<b>95% Normal UCL</b>			<b>95% UCLs (Adjusted for Skewness)</b>		
95% Student's-t UCL	459.1		95% Adjusted-CLT UCL (Chen-1995)	470.1	
			95% Modified-t UCL (Johnson-1978)	462.7	
<b>Gamma GOF Test</b>					
A-D Test Statistic	0.257		<b>Anderson-Darling Gamma GOF Test</b>		
5% A-D Critical Value	0.754		Detected data appear Gamma Distributed at 5% Significance Level		
K-S Test Statistic	0.148		<b>Kolmogorov-Smirnov Gamma GOF Test</b>		
5% K-S Critical Value	0.252		Detected data appear Gamma Distributed at 5% Significance Level		
<b>Detected data appear Gamma Distributed at 5% Significance Level</b>					
<b>Gamma Statistics</b>					
k hat (MLE)	1.106		k star (bias corrected MLE)	0.885	
Theta hat (MLE)	285.6		Theta star (bias corrected MLE)	356.9	
nu hat (MLE)	26.55		nu star (bias corrected)	21.24	
MLE Mean (bias corrected)	315.9		MLE Sd (bias corrected)	335.8	
			Approximate Chi Square Value (0.05)	11.77	
Adjusted Level of Significance	0.029		Adjusted Chi Square Value	10.71	
<b>Assuming Gamma Distribution</b>					
95% Approximate Gamma UCL (use when n>=50))	570.1		95% Adjusted Gamma UCL (use when n<50)	626.6	
<b>Lognormal GOF Test</b>					
Shapiro Wilk Test Statistic	0.921		<b>Shapiro Wilk Lognormal GOF Test</b>		
5% Shapiro Wilk Critical Value	0.859		Data appear Lognormal at 5% Significance Level		
Lilliefors Test Statistic	0.21		<b>Lilliefors Lognormal GOF Test</b>		
5% Lilliefors Critical Value	0.243		Data appear Lognormal at 5% Significance Level		
<b>Data appear Lognormal at 5% Significance Level</b>					
<b>Lognormal Statistics</b>					

## Appendix A-4: Pro UCL Output\_Lead

Minimum of Logged Data	2.862	Mean of logged Data	5.24
Maximum of Logged Data	6.731	SD of logged Data	1.237

### Assuming Lognormal Distribution

95% H-UCL	1420	90% Chebyshev (MVUE) UCL	795.2
95% Chebyshev (MVUE) UCL	988.9	97.5% Chebyshev (MVUE) UCL	1258
99% Chebyshev (MVUE) UCL	1786		

### Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

### Nonparametric Distribution Free UCLs

95% CLT UCL	447.1	95% Jackknife UCL	459.1
95% Standard Bootstrap UCL	441.2	95% Bootstrap-t UCL	496.3
95% Hall's Bootstrap UCL	544.5	95% Percentile Bootstrap UCL	452.3
95% BCA Bootstrap UCL	467		
90% Chebyshev(Mean, Sd) UCL	555.1	95% Chebyshev(Mean, Sd) UCL	663.5
97.5% Chebyshev(Mean, Sd) UCL	813.8	99% Chebyshev(Mean, Sd) UCL	1109

### Suggested UCL to Use

95% Student's-t UCL 459.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.



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## **APPENDIX A-8: SOIL DELINEATION FOR MANGANESE ARAR EXCEEDANCE**

**Figure A-8**  
**Site-Wide**  
**Soil Sampling Results**  
Manganese  
ARAR = 5,900 mg/kg

Riverside Industrial Park Superfund Site  
29 Riverside Avenue  
City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken  $\geq$  2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

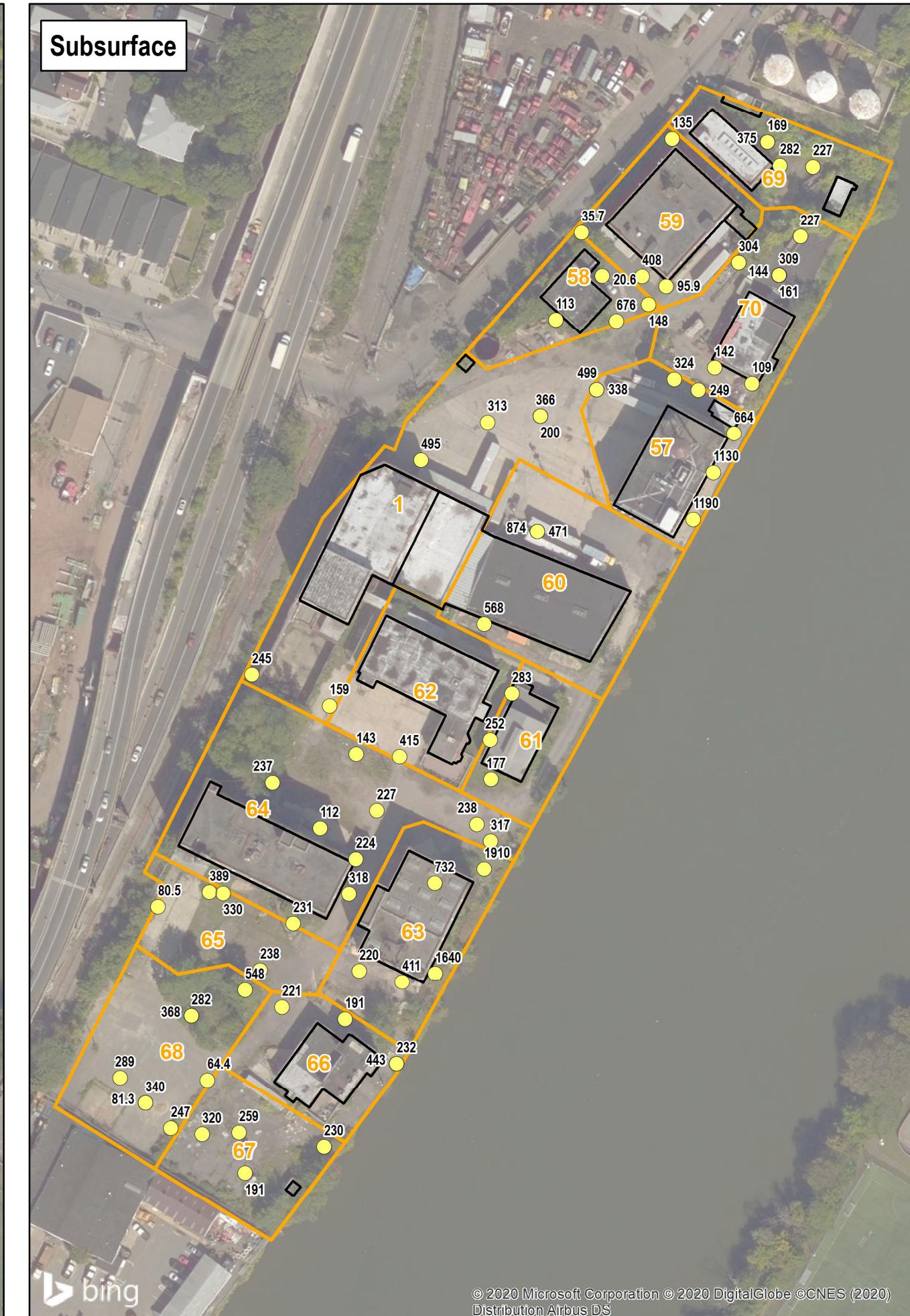
0 100 200

Feet  
1 inch = 125 feet



Project #: 0013620  
Map Created: June 2020

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### Appendix A-8: Soil Delineation for Manganese ARAR Exceedance

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Manganese	5,900	64	7340	D		
			317	D		
			207	D		
			296	D		
			254	D		
			219	D		
			262	D		
			1270.71	AVERAGE		



---

## **APPENDIX A-9: SOIL DELINEATION FOR NAPHTHALENE ARAR EXCEEDANCE**

**Figure A-9**  
**Site-Wide**  
**Soil Sampling Results**  
**Naphthalene**  
**ARAR = 17 mg/kg**

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

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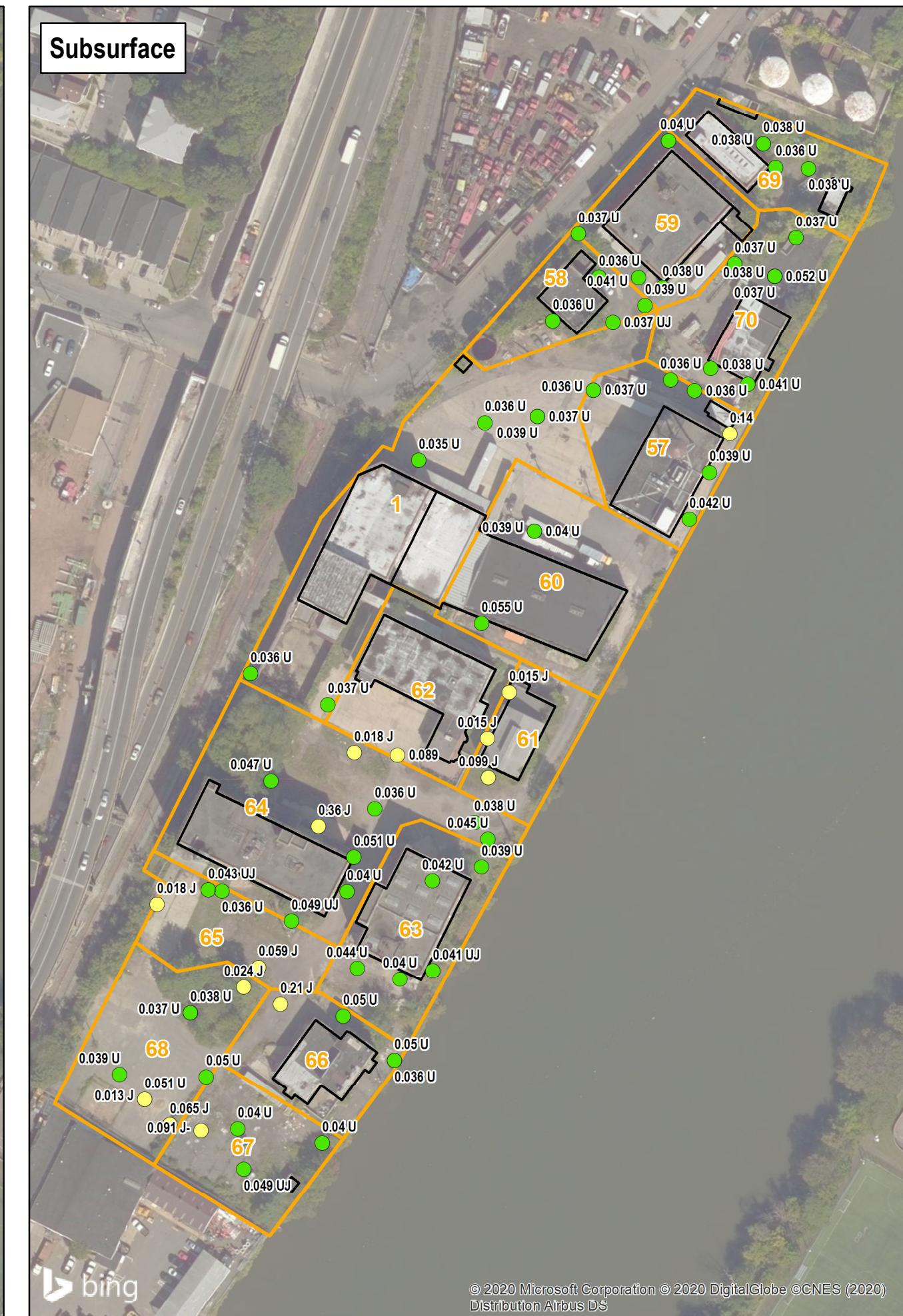
**Appendix A-9: Soil Delineation for Naphthalene ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Naphthalene	17	62	0.11	D	53	D
			0.3	D	0.19	
			0.2	D	0.2	ND
			0.21	ND	0.65	ND
			68	D	1.1	D
			13.72	AVERAGE	0.37	D
						ND
					9.13	AVERAGE



---

## **APPENDIX A-10: SOIL DELINEATION FOR PCB-1254 ARAR EXCEEDANCE**



**Figure A-10**  
**Site-Wide**  
**Soil Sampling Results**

Riverside Industrial Park Superfund Site  
29 Riverside Avenue  
City of Newark, New Jersey



## Legend

## RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
  - Detection Below ARAR (yellow)
  - Detection Exceeds ARAR (blue)

— Buildings (Survey)

□ Lot Boundary

Notes

1. Locations with multiple results represent multiple sample depth intervals at that location.
  2. Surface samples taken < 2', subsurface samples taken  $\geq$  2' based on initial interval depth.
  3. Field duplicate results not plotted.
  4. See results tables for qualifier definitions.

6 100 200

Feet  
1 inch = 125 feet



Project #: 0013620  
Map Created: June 2020

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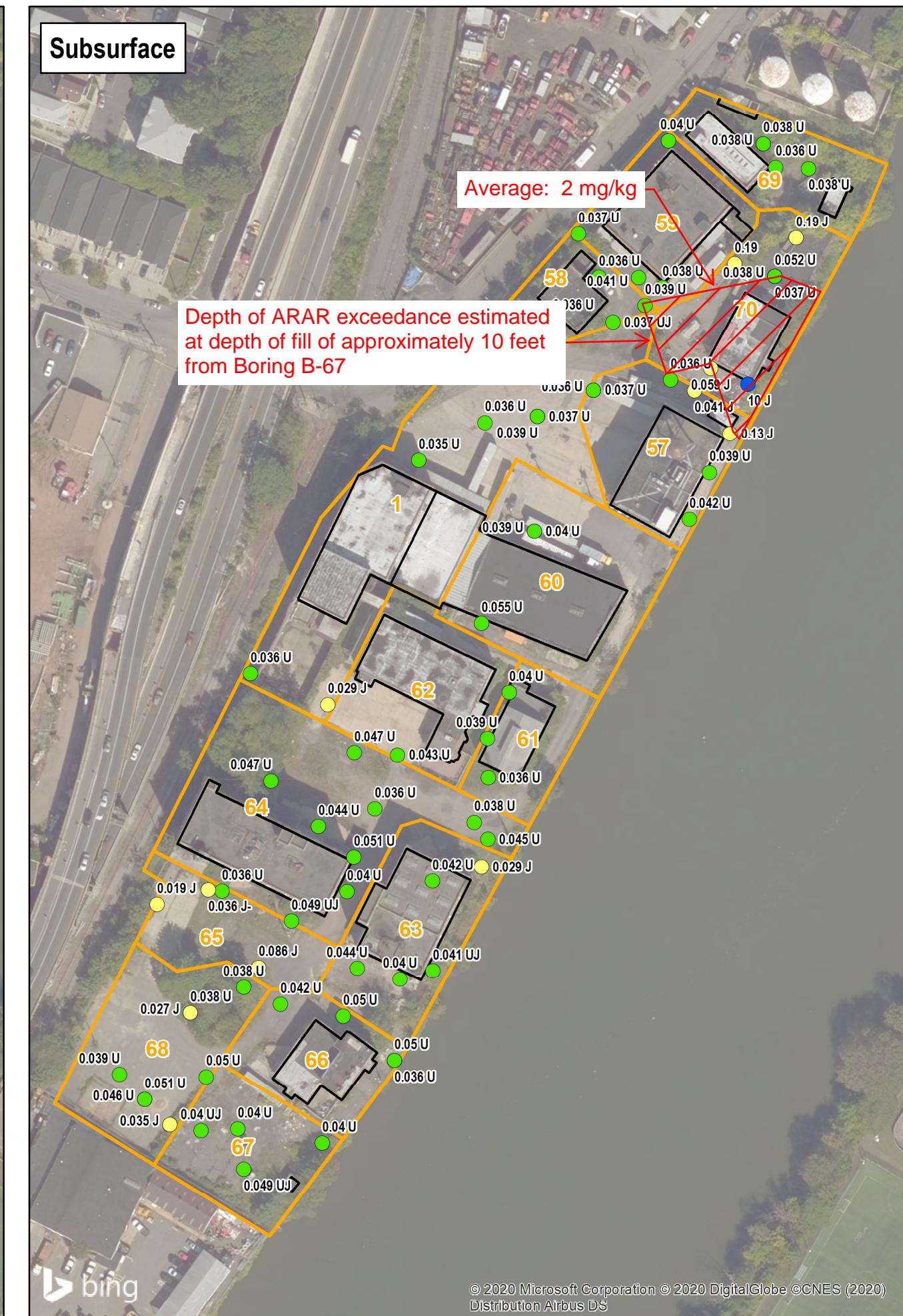
**Appendix A-10: Soil Delineation for PCB-1254 ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
PCB-1254	1	57/60/70	0.036	ND		
			0.035	ND		
			0.037	D		
			0.084	D		
			1.7	D		
			0.36	AVERAGE		
		1/62/64	0.039	ND		
			0.038	ND		
			0.45	D		
			0.045	D		
			1.4	D		
			0.011	D		
			0.32	AVERAGE		
		66/67	0.036	ND		
			0.038	ND		
			0.0073	D		
			0.084	D		
			0.093	D		
			0.036	ND		
			2.2	D		
			0.34	AVERAGE		



---

## **APPENDIX A-11: SOIL DELINEATION FOR PCB-1260 ARAR EXCEEDANCE**



**Figure A-11**  
**Site-Wide**  
**Soil Sampling Results**

Riverside Industrial Park Superfund Site  
29 Riverside Avenue  
City of Newark, New Jersey



## Legend

## RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
  - Detection Below ARAR (yellow)
  - Detection Exceeds ARAR (blue)

— Buildings (Survey)

□ Lot Boundary

Notes

1. Locations with multiple results represent multiple sample depth intervals at that location.
  2. Surface samples taken < 2', subsurface samples taken  $\geq 2'$  based on initial interval depth.
  3. Field duplicate results not plotted.
  4. See results tables for qualifier definitions.

0      100      200

Feet

1 inch = 125 feet



Project #: 0013620  
Map Created: June 2020

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**Appendix A-11: Soil Delineation for PCV-1260 ARAR Exceedance**

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
PCB-1260	1	1/70/57/60	0.038	ND		
			0.037	ND	0.052	ND
			0.038	ND	2.2	D
			0.039	ND	10	D
			0.059	D	0.13	D
			1.8	D	0.036	ND
					0.039	ND
			0.31	AVERAGE	2.06	AVERAGE
	1/62/64	1/62/64	1.6	D		
			0.039	ND		
			0.038	ND		
			0.038	ND		
			0.036	ND		
			0.32	AVERAGE		
		66/67	0.036	ND		
			0.038	ND		
			0.036	ND		
			0.069	D		
			0.1	D		
			2.8	D		
			0.034	ND		
			0.42	AVERAGE		



---

## **APPENDIX A-12: SOIL DELINEATION FOR PCB-1262 ARAR EXCEEDANCE**

**Figure A-12**  
**Site-Wide**  
**Soil Sampling Results**  
 Aroclor-1262  
 $ARAR = 1 \text{ mg/kg}$

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken  $\geq 2'$  based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

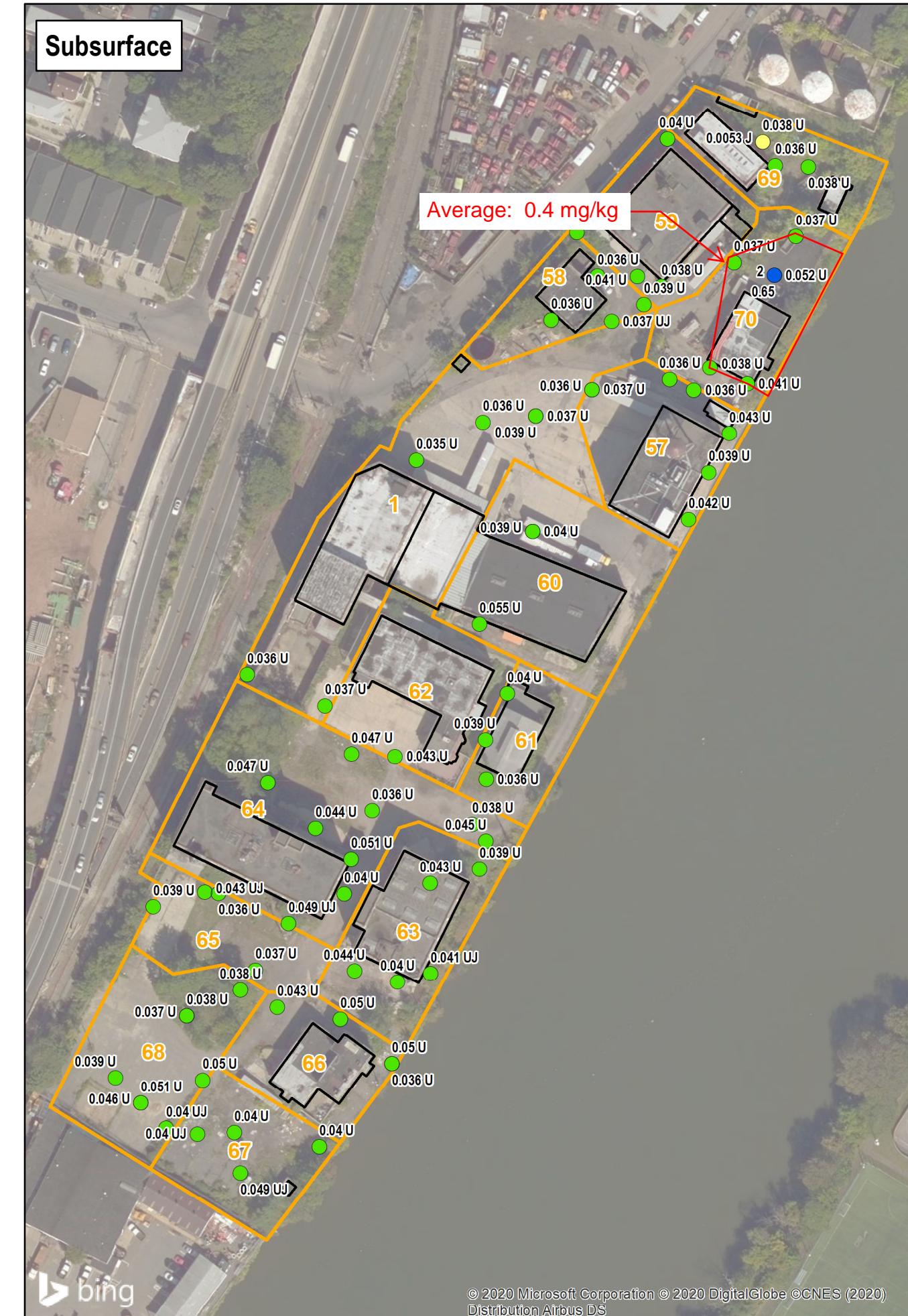
0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

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### Appendix A-12: Soil Delineation for PCB-1262 ARAR Exceedance

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
PCB-1262	1	70			2	D
					0.037	ND
					0.041	ND
					0.038	ND
					0.037	ND
					0.4	AVERAGE



---

## **APPENDIX A-13: SOIL DELINEATION FOR VINYL CHLORIDE ARAR EXCEEDANCE**

**Figure A-13**  
**Site-Wide**  
**Soil Sampling Results**  
 Vinyl Chloride  
 ARAR = 2 mg/kg

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

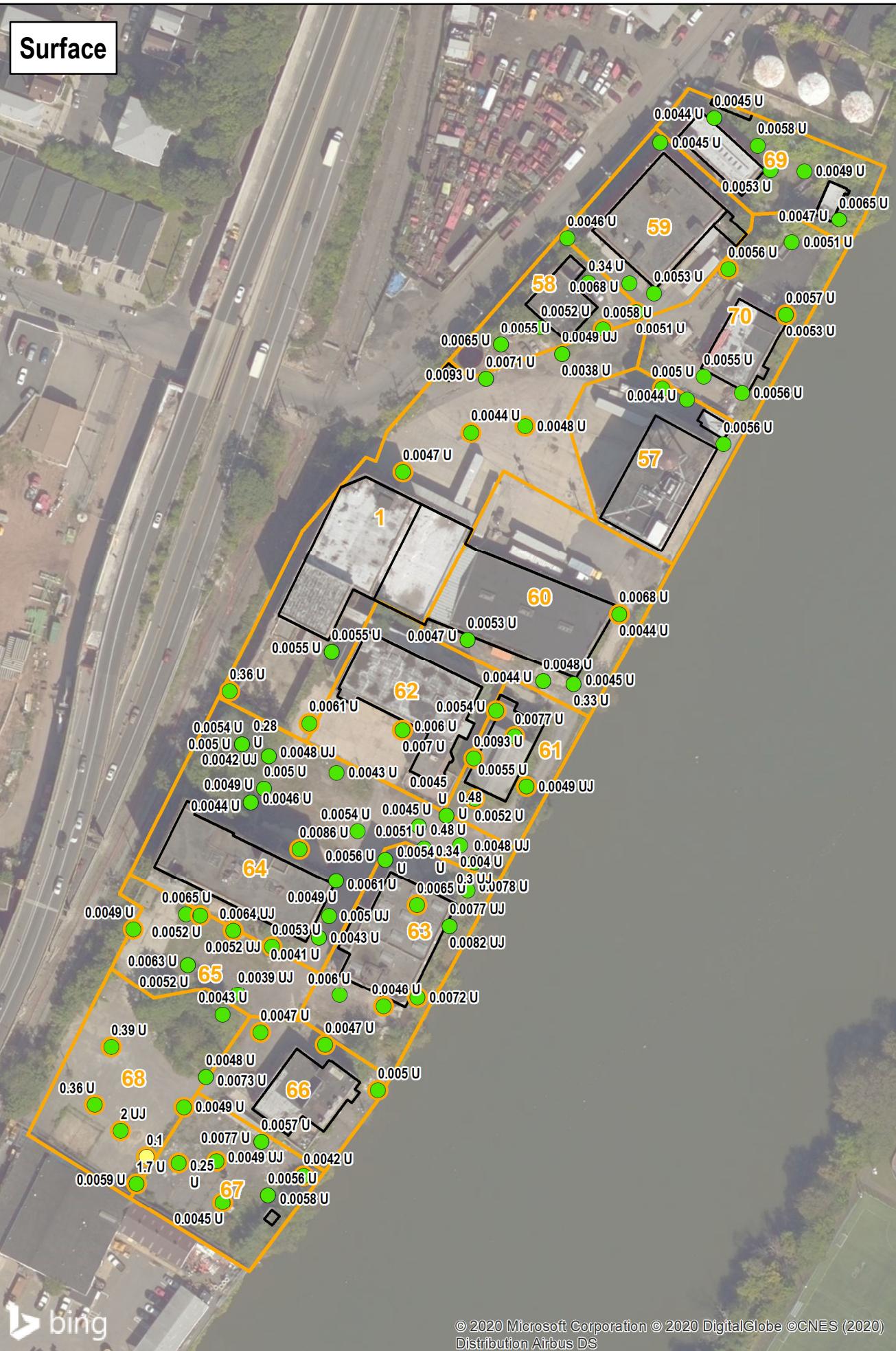
0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

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### Appendix A-13: Soil Delineation for Vinyl Chloride ARAR Exceedance

COPC	ARAR (mg/kg)	Lots	Concentration - Surface mg/kg	D/ND	Concentration - Subsurface mg/kg	D/ND
Vinyl Chloride	2	68			2.9	D
					0.074	D
					0.0047	ND
					0.0075	ND
					0.7435	AVERAGE



---

## **APPENDIX A-14: SOIL DELINEATION FOR COPPER PRG EXCEEDANCE**

**Figure A-14**  
**Site-Wide**  
**Soil Sampling Results**  
**Copper**  
**PRG = 526 mg/kg**

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

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## **APPENDIX A-15: SOIL DELINEATION FOR NAPHTHALENE PRG EXCEEDANCE**

**Figure A-15**  
**Site-Wide**  
**Soil Sampling Results**  
**Naphthalene**  
**PRG = 6.2 mg/kg**

Riverside Industrial Park Superfund Site  
 29 Riverside Avenue  
 City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
 1 inch = 125 feet



Project #: 0013620  
 Map Created: June 2020

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## **APPENDIX A-16: SOIL DELINEATION FOR TRICHLOROETHENE PRG EXCEEDANCE**

**Figure A-16**  
**Site-Wide**  
**Soil Sampling Results**  
Trichloroethene  
PRG = 0.05 mg/kg

Riverside Industrial Park Superfund Site  
29 Riverside Avenue  
City of Newark, New Jersey



### Legend

#### RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
- Detection Below ARAR (yellow)
- Detection Exceeds ARAR (blue)
- Buildings (Survey)
- Lot Boundary

#### Notes:

1. Locations with multiple results represent multiple sample depth intervals at that location.
2. Surface samples taken < 2', subsurface samples taken ≥ 2' based on initial interval depth.
3. Field duplicate results not plotted.
4. See results tables for qualifier definitions.

0 100 200

Feet  
1 inch = 125 feet



Project #: 0013620  
Map Created: June 2020

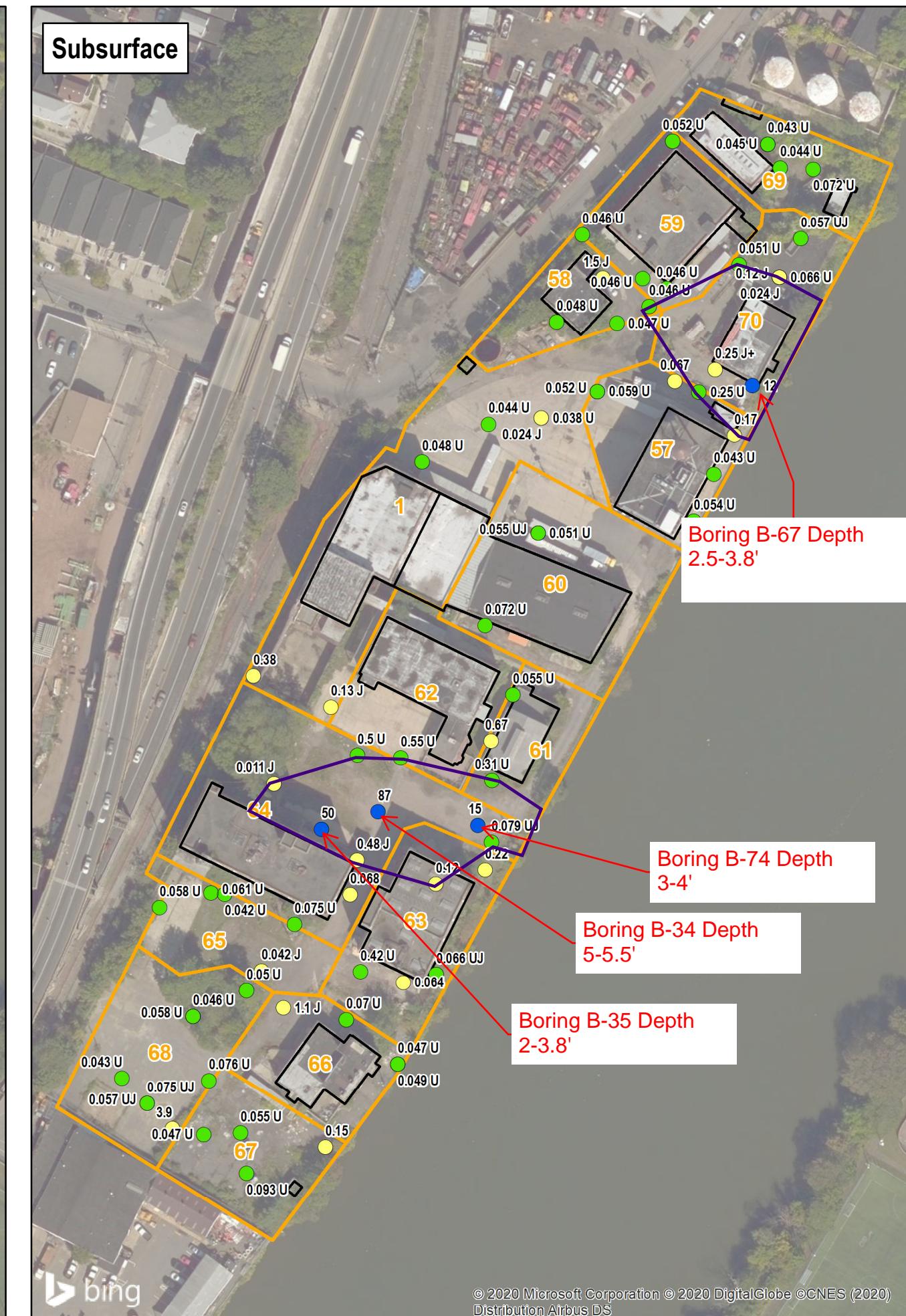
Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk.





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## **APPENDIX A-17: SOIL DELINEATION FOR XYLENES PRG EXCEEDANCE**



**Figure A-17**  
**Site-Wide**  
**Soil Sampling Results**

Riverside Industrial Park Superfund Site  
29 Riverside Avenue  
City of Newark, New Jersey



## Legend

## RIFS Soil Sampling Results (mg/kg)

- Result Not Detected (green)
  - Detection Below ARAR (yellow)
  - Detection Exceeds ARAR (blue)

— Buildings (Survey)

□ Lot Boundary

#### **Notes:**

1. Locations with multiple results represent multiple sample depth intervals at that location.
  2. Surface samples taken < 2', subsurface samples taken  $\geq$  2' based on initial interval depth.
  3. Field duplicate results not plotted.
  4. See results tables for qualifier definitions.

0 100 200

1

Feet

1 inch = 125 feet

1

1

5

WOODARD  
& SUBBAN

Project #: 0013620  
Map Created: June 2020

Map Created: June 2020

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk.



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## **APPENDIX A-18: AREAS AND VOLUMES OF ARAR/PRG EXCEEDANCE FOR SOIL ALTERNATIVES**

Appendix A-18  
Areas and Volumes for Soil Alternatives

Alternative 2

Description	Area (sf)	Depth (ft)	Volume (cf)	Volume (cy)
LNAPL - UST Surface/Subsurface Soil Exc.	6590	13	85670	3173
LNAPL (and copper at B-33) Surface/Subsurface Soil Exc.	1060	7	7420	275
	LNAPL TOTAL		93090	3448

Alternative 3

Description	Area (sf)	Depth (ft)	Volume (cf)	Volume (cy)
Cap excludes Lots 60/66 and building slabs	248140			
Lot 60		7360		
	Total	255500		
LNAPL - UST Surface/Subsurface Soil Exc.	6590	13	85670	3173
LNAPL (and copper at B-33) Surface/Subsurface Soil Exc.	1060	7	7420	275
	LNAPL TOTAL		93090	3448

Alternative 4

Description	Area (sf)	Depth (ft)	Volume (cf)	Volume (cy)
Cap	248140			
Lot 60		7360		
	Total	255500		
Lead/Arsenic Surface/Subsurface Soil Exc.	12910	6	77460	2869
LNAPL - UST Surface/Subsurface Soil Exc.	6590	13	85670	3173
LNAPL (and copper at B-33) Surface/Subsurface Soil Exc.	1060	7	7420	275
	LNAPL TOTAL		93090	3448

Appendix A-18  
Areas and Volumes for Soil Alternatives

Alternatives 5, 6, 7

Description	Area (sf)	Depth (ft)	Volume (cf)	Volume (cy)
B(a)P -Surface Soil				
	10820	2	21640	801
	3900	2	7800	289
	12310	2	24620	912
	16110	2	32220	1193
	2440	2	4880	181
	Subtotal		91160	3376
Lot 68 Copper - surface soil	5160	2	10320	382
B(a)P -Surface/Subsurface Soil				
	14260	10	142600	5281
	1170	10	11700	433
	27650	10	276500	10241
	Subtotal		430800	15956
Lead and PCB 1260 Surface/Subsurface Soil	26660	10	266600	9874
includes collocated PCB Aroclor 1260 on Lot 70	14050	10	112400	4163
Lead, Arsenic, and Benzene Surface/Subsurface Soil	18985	11	208835	7735
includes collocated benzene on Lot 61 surface	1620	2	3240	120
includes collocated benzene on Lot 61/62/64 subsurface	6000	11	54000	2000
	Subtotal		475435	17609
	TOTAL NON-LNAPL		1007715	37323
LNAPL - UST Surface/Subsurface Soil Exc.	6590	13	85670	3173
LNAPL (and copper at B-33) Surface/Subsurface Soil Exc.	1060	7	7420	275
	LNAPL TOTAL		93090	3448



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## **APPENDIX A-19: AREAS AND VOLUMES OF PRG EXCEEDANCE FOR SOIL GAS ALTERNATIVES**

Appendix A-19  
Areas and Volumes for Soil Gas Alternatives 3 Through 5

Soil Gas Alts 3-5

Description (areas within 100' of occ. Buildings)	Area (sf)	Depth (ft)	Volume (cf)	Volume (cy)
Lot 60 through 64 surface/subsurface soil	30610	6	183660	6802
Lot 57/58/59/60/70 surface/subsurface soil	1060	6	6360	236
Lot 1/58 surface soil	6840	2	13680	507
Subtotal			203700	7544